FARMERS DIGEST

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The Farmer's Digest

Volume 8 July, 1944 Number 3

Fill Your Silo with Grass

Condensed from Eastern States Cooperator

C. B. Bender

Agricultural Experiment Station, New Brunswick, New Jersey

GRASS silage is more important this year than ever before. Grass silage is a better method of preserving quality roughage for the herd by preventing the losses so common in making hay out of first cuttings of legumes and mixtures of legumes and grasses. It also improves the marketability of milk by imparting better color and flavor to the product.

Grass silage is one part of the roughage diet of dairy cattle; hay is the other. Together they are a smooth working team when both are of good quality. Fed liberally they will furnish the nutrients necessary for approximately 70 percent of a cow's inherent milk production. Liberal feeding of these high quality roughages eliminates worry about the need of high protein grain concentrates and reduces the amount of grain necessary for milk production.

Making grass silage from first cuttings of legumes and mixtures of grasses and legumes helps insure a high quality silage. If hay were made of these same cuttings, the chances are that a large percentage of the nutrients would be lost, due mainly to weather hazards.

Losses in nutrients in hay making are multiple ones. Under perfect field curing conditions losses are low, but there are losses due to leaf shattering in handling. Under poorer curing conditions there are losses of vitamins and carbohydrates due to leaching and fermentations. Tobacco-cured hay represents a 40 percent loss in dry matter. After hay is partially cured, rains really do a job by leaching out protein and nitrogen-free extract. Dry matter losses as high as 30 percent are frequently found and this doesn't show the true picture because fiber is not leached; only the more digestible nutrients are lost —in fact, 40-60 percent losses of them are not uncommon.

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Making hay out of second cuttings of legumes usually is carried out when the weather is more ideal for hay making and good quality is assured.

When grain is high in price and the nutrients in grain cost more than hay nutrients, then it is poor economy to feed light on hay and heavy on grain. When the nutrient content of hay is low because a large percentage of the nutrients was leached out, the animals may eat about as much of it but production will fall unless more grain is fed to make up for the deficiency in the hay. This is poor economy when good farming methods would have prevented most of these losses by ensiling the material during inclement weather.

The only time you could afford to do this would be under these conditions: when hay is worth $10 and grain is selling for $15 per ton or if hay costs $20 with grain at $30 a ton. In each case one pound of nutrients costs the same in hay as in grain. If the grain costs more than these ratios, the practice is not sound if the dairyman is interested in net profit rather than gross income.

The best quality grass silage, that is, a material that has clean silage odor, can be gotten only through the addition of a preservative. In order to allow green material to go through the normal fermentation process, common in corn silage, some form of sugar must be added. Molasses seems to fill the bill to the best advantage, and the experimental results on this preservative are well established. Molasses, however, may be hard to get. Seventy-five pounds per ton of green material usually furnishes sufficient sugar for the best preservation.

Excellent quality grass silage can also be made by using ground cereal grains as the preservative. Because of the feed shortage and price of grains, this method is not attractive in the Northeast.

Our exprimental work has shown that corn meal or corn and cob meal, ground barley or wheat does an excellent job of preserving grass silage when used at the rate of 200 to 250 pounds of grain per ton of green silage. The silage is of excellent quality and the total digestible nutrient content is increased. When larger amounts of grain are added, say from 400 to 500 pounds per ton of green material, dry matter losses of the silage are increased beyond the normal losses. This no doubt is due to the reduction in moisture of the mass which causes increased oxidation losses.

The wilting method of preservation can be used if experimental techniques can be applied to a farm practice. This method is the hardest one to use and has had

too many failures to its credit when tried on the farm.

The disadvantages of the wilting method in ensiling without preservatives are that under farm conditions it is too difficult to control the moisture content at the desired level of 65 to 67 percent. The farmer, in order to use this control, must mow a little grass, then wait until it wilts and put it in the silo. If he mows down a lot of material on a good curing day, too much moisture is lost and the light weight material is always on top of the silo and pressures are reduced. Delays due to break downs, rain storms and Sundays all are hazards in this method; the silage is not uniform and therefore subject to mold growth. Where the farmer has an optimum of labor and machinery and can control the moisture factors absolutely, then the method will be successful.

Bacterial cultures and salt as the preservative are being studied. The experiment stations conducting research on this method report as much success through using salt alone as when they used cultures and salt. In either case the results were not promising.

Dry hay can be used as a preservative if approximately 300 pounds are run through the chopper with each ton of green material. This silage, however, is not as high in quality as where molasses or cereal grains are used.

From the experimental results, we have found that the nutrients in grass silage are equal in feeding value to the nutrients in other roughage. This silage is high in carotene which is important in animal health. This carotene in the silage increases the carotene and vitamin A content of milk. Milk produced on this feed has a better flavor. Feeding grass silage and hay in optimum amounts will reduce the grain needs as well as the protein needs for milk production.

In feeding grass silage, one should never lose sight of the fact that hay has a definite place in the feeding system. Grass silage is high in vitamin A but has practically no vitamin D. The cow needs vitamin D for mineral metabolism. This must be supplied by field cured hay if we are conscious of cost figures in milk production. For this reason we recommend from eight to 10 pounds of hay a day as the correct amount to feed with the grass silage.

Wartime Work Swappage

Condensed from Capper's Farmer

LABOR and equipment pools are becoming more common as a means of meeting man power and equipment shortages. Farmers are working together in pairs and groups, carrying co-operation beyond the old-established custom of neighborhood work swapping. It's a logical solution to the help problem and a way to insure maximum service from implements available, regardless of ownership.

Frequently the exchange of ideas and methods, an evolution of devices, as well as the pooling of labor and machinery, effect a reduction in both personnel and time required for a specific job. Such was the case of 4 farmers in Woodford county, Illinois, James Parkouse, Eugene Mayne, Paul Shuman and Robert Mayne. A custom of trading help, established by their fathers for big-crew jobs, has been continued into their generation. It was logical, therefore, that they should co-operate in haying. But they conceived a system which saved labor and speeded operations. With a tractor-mounted 10-foot buck they hauled the hay from fields to the respective barns, distances of 80 to 120 rods. With the equipment, 5 men constituted the crew, 1 each on the tractor, the fork and the hoist team and 2 in the mow. Previously the same men co-operating had used 8 men, including 2 field pitchers, 3 on racks, 1 at the hoist and 2 in the barn.

One afternoon between 1:30 and 5:30 o'clock they put up the crop from 8 acres. During that time they averaged 5 buckloads, of 1,000 pounds each, to each rack load put up by a 7-man crew working on a nearby farm.

Robert Mayne owns a picker. The others help him get his corn out and then he picks for them at $1 an acre. A similar arrangement is in effect for harvesting small grains and beans with a 6-foot combine owned by Paul Shuman. Another co-operative project is preparation of seedbeds. Tractors and other tillage equipment are pooled for plowing, harrowing and disking. Then the planting is done on all farms with 4-row equipment owned by a hybrid producer for whom they grow seed.

The co-operation extends to odd jobs as well as crew operations. For instance, if there are pigs to castrate or vaccinate, or if any one of the neighbors gets behind in his field work, the others lend a hand. Experience has proved that during a year each will

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receive about as much help as he gives, so no books are kept and there is no cash accounting.

J. A. Andrews, LaSalle county, John Ames and Glen Smith, Marshall county, Illinois, co-operate in operating a pick-up press. A 7-man crew will bale and store 650 bales a day and that, they estimate, is about twice the tonnage formerly handled loose. The press makes haying a cleaner and easier job, insures higher-quality roughage because it saves leaves and the hay is easier to feed.

Both labor and equipment are traded by Carl J. Koch and Hugh Harris, Richland county, Wisconsin. Koch works the corn on both farms with his tractor cultivator, Harris does the mowing. They work together in putting up hay, binding, shocking and threshing small grain.

A shift from sweep rakes and stationary stacker to a tractor-mounted stacker buck alleviated the labor problem for F. W. Held and his brother B. F. Held, Plymouth county, Iowa. With one man to operate the outfit and 2 to stack, they put up two 8-ton stacks between 2 and 6:30 o'clock one afternoon. That, they estimated, was about twice as much as they averaged with the same crew and the old equipment.

A 3-way exchange between neighbors in Madison county, Illinois, has extended the service of privately-owned equipment. James Morrison contributed the combine, Albert Steinmeyer the pickup hay press, Walter Rinkel the silage cutter and lime spreader for crew jobs on the 3 farms.

Harry Bidinger and Peter Fasen, Stearns county, Minnesota, bought a field ensilage cutter because silo-filling crews became increasingly harder to assemble. The 5-man crew will fill a 14- by 40-foot silo in a day, which is about a third the man power formerly used. They also operated the outfit in custom work, with farmers supplying needed labor. They filled 22 silos in a short season. Trucks with dump bodies are used in hauling the field-cut material. The same trucks are used in haying by removing the dump bodies and substituting trailers equipped with 8- by 16-foot racks. Attachment for the trailers is afforded by a 4 by 6 timber across the truck frame with a kingpin thru it and the rack hitch. This form of transport made a 20-mile loose hay haul practicable for Fasen.

Floods created an emergency in the bottom-lands section of Randolph county, Arkansas. A labor and an equipment pool was formed by Basil Barnett, Donald McCalister, Mont Jackson, L. B. Sallee, J. D. Wells and Willard Barnett. As rapidly as land dried, regardless of ownership, they put fields in order and plant-

ed. They were thus able to plow, disk and plant as much as 40 acres a day. In small-grain harvest they used 2 combines, and 3 other tractors in the pool followed immediately in preparing the fields for succession crops.

Deferred Feeding

Condensed from Successful Farming

Walter J. Daly

IN a mass demonstration to determine the value of the Kansas deferred-feeding system, 22 Wabaunsee County, Kansas, farmers pooled their orders in the fall of 1942 and bought 2,430 Texas calves.

It was lucky that they selected such a versatile feeding program. Before the year was over, due to unsettled markets and the feed shortage, they were going all directions with their cattle. But, thanks to the efficient gains that calves make when handled in this manner, they all ended up in the black, though profits were much less than anticipated.

These men were out to find the most profitable way to sell their grass, silage, and alfalfa hay, the raw products of Wabaunsee County agriculture, for which beef cattle offer the best market. The problem facing these "family-sized" operators was to find a feeding program that would involve the least risk and yet return a fair profit.

Under the leadership of County Agent Howard Myers, the men decided to try the Kansas deferred feeding system developed by Kansas State College, which has been defined as: "Starting in the fall with good-quality calves, producing 225 to 250 pounds of gain during the winter, grazing 90 days without feed other than grass, and then full-feeding 100 days in dry lot."

This system has enabled stockmen to market an attractive carcass with a maximum use of roughage and grass and the minimum amount of grain. There are many variations that make it especially adaptable to present unsettled war conditions.

If heifers are used, little if any concentrate other than some protein is fed the first winter. Heifers fed grain usually get so fat it's not profitable to turn them on grass.

However, some operators buy both steer and heifer calves and feed them all the regular wintering ration (four to five pounds of grain plus protein supplement, in addition to a full feed of silage and preferably some alfalfa hay). When spring comes, the steers go to grass and are handled accord-

Reprinted by permission from Successful Farming, Des Moines, Iowa, May, 1944

ing to the standard deferred-feeding system. The heifers remain in the feed lot and are marketed in early summer after a period of full feeding. This diversifies the program and makes two paydays during the year.

One of the Wabaunsee County men who bought heifers is Walter Hund. He believes heifers will produce the good grade of beef now in demand on less grain than steers. His 60 heifers weighed 333 pounds delivered in November, 1942, and cost $42. He got a winter gain of 170 pounds, a pasture gain of 150 pounds, and a feedlot gain of 125-pounds.

Hund reports feed cost as follows: Wintering, $15; pasture bill, $5; and full-feeding phase, $18. Added to the $42 first cost, this made a total cost of $80 a head at marketing time, which left a profit of about $15 a head after they were sold at Kansas City as fat heifers.

However, he wishes he had sold off the grass in August last year as did some of the other Wabaunsee County men. His brother, Steve, sold 12 heifers off pasture and they brought $13 a hundred. Twenty-five more (from the same group) were brought into the feed lot and fed 56 days, and they sold for only $12.50. In general, the men who sold off grass made the most money.

Calves sold off grass usually go to Cornbelt feeders, but last year many of them went to the packers. Selling feeders in the fall is just another angle to the deferred-feeding system. County Agent Myers thinks that the records his men are keeping might prove that in a majority of years feeders are most profitable for his county.

A. E. Stuewe bought 150 Texas calves in October, 1942. Seventy-five head balanced the scales at 350 pounds, and Stuewe probably will sell them off grass next summer.

The other 75 calves averaged 450 pounds pay weight in Texas a year ago and have gone to market. Initial cost of these calves was approximately $60 per head, to which was added a $16.50 wintering cost.

A 200-pound winter gain was put on with a ration consisting of 30 pounds silage, 1 cottonseed meal, and 2 ground kaffir. Pasture rental ran $8.50 a head and showed 150 pounds of summer gain.

Full feeding started last September 17, and the initial 30-day feeding showed a daily ration of approximately 35 pounds silage and 5 pounds ground corn. From 31 to 60 days the ration consisted of 25 pounds silage and 10 pounds grain; from 61 to the 100-day stage the silage was reduced to 10 pounds and grain increased to 18 pounds daily.

Alfalfa hay was the only protein fed the first 60 days, but during the last 40 days 1 pound of cottonseed meal was allowed per head daily. Figuring silage at $6 a ton, alfalfa hay at $15 a ton, corn at $1.10 a bushel, and cottonseed meal at $60 a ton, the full feeding for 100 days cost $31.31 per head. This cost showed a 200-pound dry lot gain.

The total cost, including calf cost, wintering, grazing, and full feeding, was $116.31 a head. The cattle were sold in three shipments to the Kansas City market at $14.25, $14.15, and $14.50, respectively. The selling weight averaged about 940 pounds and after deducting freight and marketing expenses, showed a net profit of $19.69 a head.

After having this proposition carefully analyzed, Stuewe determined that the wintering cost per 100 pounds gain was $8.50; grazing cost, $4.24 per 100 pounds; and the expense of full feeding was $15.65 to secure 100 pounds of eatable steak and roast rib. He plans to use Balbo Rye to cut wintering cost and to start with heavier cattle in another year.

Though the Kansas Deferred System was developed on bluestem grass, Dr. C. W. McCampbell, head of the Animal Husbandry Department at Kansas State College, has this to say: "It's a good system for any grass. Bluegrass and brome grass work just as well. However, regardless of the kind of grass, it should be good."

In the bluegrass country of northeast Kansas, Roy Wilson, Brown County, says concerning deferred feeding: "This method is a winner and has the least speculation of any." Buying calves in the fall about the time the finished animals are sold reduces speculation.

Wilson follows closely the Kansas State College recommendations. He can put his calves on bluegrass ahead of the men who use bluestem, but the bluegrass dries up earlier in the summer. However, this is often an advantage for it gets the calves on full feed sooner.

His advice is never to let the calves go back. Enough grain is fed to keep them gaining all winter and they're not turned on bluegrass until it is good. Wilson starts feeding grain whenever the grass begins to dry up and there's any danger of the cattle losing finish. He gets them up to full feed on pasture and then moves to dry lot.

Dr. McCampbell says: "A common mistake with this system is not feeding well in the winter. People think calves will make cheap gains on grass if thin in the spring, but they get more growth on the grass and less finish." He adds: "Winter gain is not so important now

when there is little premium for choice beef."

Because of this wartime demand for the good grade of beef, Wabaunsee County operators are feeding less grain in the winter than the standard Kansas system calls for. Their top winter gain was 220 pounds, with an average of about 190. They use more grass and roughage, save grain, and yet are able to produce a good carcass at the end of the full-feeding period — or, if they want to sell stock off grass in the fall as feeders, the cattle are in the condition favored by Cornbelters at present.

This deferred-feeding system is truly a versatile way of making beef. It can be adapted to most any kind of a market except an OPA "rollback."

Wonder Drug Thrives on Farm Diet

Condensed from Southern Agriculturist

YOU'VE heard of penicillin, the remarkable new drug that is so successful in the treatment of wounds and other infectious diseases common to the battlefront. It has already saved the lives of many soldiers, will undoubtedly save the lives of thousands more, and is as important in its field as the sulfa drugs are in theirs. Penicillin has come into the limelight fast, but the general public is not aware that its production is linked up with agriculture. The mold that produces penicillin lives on a diet of agricultural products.

Penicillin gets its name from the mold that produces it—*Penicillium notatum*. This is a green-colored mold resembling the one sometimes seen on bread or cheese. The mold grows easily but does not yield worth-while quantities of penicillin unless kept under ideal conditions and fed on the proper diet. It's a laboratory job that must be done under controlled conditions.

The observations which led to the discovery of penicillin were made in 1929 by the British scientist Alexander Fleming. Medical men learned that penicillin was one of *the* great microbe destroyers, but yield was so low that commercial production was out of the question. War needs for this drug caused British scientists to bring the penicillin problem to the United States during the summer of 1941 in hopes that U. S. methods of big-scale production might be applied.

These men were sent to the U. S. D. A.'s Northern Regional Research Laboratory at Peoria, Illinois, where scientists started the work that increased the yield of penicillin to the point where it

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could be taken over by industry. Dr. A. J. Moyer, mycologist, tried feeding penicillin mold on a new diet from the steeping liquor obtained in the production of corn starch. Some of this liquor is used in making yeast, but because there is no other use for it, most of it goes into cattle feed. The mold liked this new diet, and penicillin production increased sharply — a hundredfold in a short time. The agricultural scientists found that, in addition, the mold liked some lactose sugar which comes from cow's milk.

At first penicillin was produced in flasks about the size of two-quart milk bottles. The mold floats on top of the liquid and secretes the penicillin, which has to be recovered and purified. When ready for use, it is in the form of a golden-yellow powder, which must be dissolved and injected into the blood stream or muscle.

As penicillin production has increased, the cost has decreased from a high of around $200 to the present price of $50 per one million units, the amount needed to conquer one case of osteomyelitis or six to eight cases of gonorrhea. But cost is not limiting the use of this drug—there just isn't enough being produced to meet the demands. The armed forces have first call on penicillin, but a small (and increasing) amount is being set aside for civilian use, and every effort is being made to step up production.

Penicillin can be used freely without fear of harmful effects. It is being used successfully in treating pneumonia, and is most effective against the "blood poison" infections that take such heavy toll. It is comforting to know that production is on the up-grade — and that agriculture had a hand in the development of this swift germ killer.

Tractor-Mounted Seeders

He was tired of walking back and forth across the field with a hand-cranked seeder, so Theodore Pharis, Bates county, Missouri, made himself a tractor-seeder for legumes and grasses. He welded a 6-inch V-belt pulley to the generator pulley of his tractor to drive it. Part of the gear mechanism of an old cream separator was used as a speed reduction device. When a 2½-inch pulley was put on the bowl shaft and the radial-ribbed wheel of an endgate seeder was attached to turn with the worm wheel of the separator, the speed was just right to scatter seed evenly over a satisfactory space. Pharis installed a cream can as seed hopper. The seed is let out thru a hole in the bottom. Size of the opening is regulated by a slide, operated from the tractor seat by a rod.

—Capper's Farmer

Sheep Worm Themselves by New Method

Condensed from The Cattleman

R. B. Elling

County Agent, Franklin County, Kansas

THAT sheep will subject themselves to the self-administration of intestinal parasite control materials was recently demonstrated on Mr. Verne Alden's farm in Franklin County, Kansas.

Used in the demonstration was a commercially mixed combination of phenothiazene, copper sulfate, and nicotine sulfate. The ingredients are so blended as to do a complete worming job with one administration.

Mr. Alden's flock of 250 western ewes made excellent demonstration material. His ewes are kept in good physical condition, receive ensilage, alfalfa hay, corn and ground soybeans. Formerly Mr. Alden drenched with phenothiazene at least twice a year. His ewes did not have the appearance of being infested, wherein lies the beauty of the "feed treatment." The aim of flock owners is economical profit. The economy of thrifty, clean ewes is understood by all sheep men, but the labor-heavy task of hand administering the anthelmintic is often delayed until evidence of parasites shows up and, of course, by that time part of the cost has been paid. One of the jobs of the "feed treatment" should be keeping thrifty flocks thrifty.

The Alden flock was placed on a limited feed 24 hours prior to the treatment. Customarily the ewes would have received an evening feed of silage, corn, and ground soybeans, and a morning feed of alfalfa hay. The evening prior to the treatment they received a somewhat reduced feed of ensilage, no corn, no soybeans, and no alfalfa hay the next morning. That afternoon the flock was hungry, an item of utmost importance. The demonstration, under the supervision of C. G. Elling, State Extension Sheep Specialist, included the process of thoroughly mixing the desired amount of the preparation with the usual amount of ensilage, corn, and soybeans—thoroughly cleaning the feed rack of dirt and old feed, and the scooping of the mixture to the flock. The ewes, being hungry immediately went to the racks and commenced eating.

Reprinted by permission from The Cattleman, Fort Worth, Texas, May, 1944

Mr. Elling suggested that traces of red urine stains in the fleece and bedding 12 to 18 hours following treatment would indicate an intake of phenothiazine into the system. Mr. Alden reported the next day that these traces were found—further that very little feed or preparation was present in the racks by the next day. The job had been done in fifteen minutes, the additional time required to mix feed and ingredients, and at a cost comparing favorably with a straight phenothiazine drench. The preparation was mixed at the rate of one-fourth pound per head. The cost per head was 6¼c exclusive of time and labor.

Mr. Elling pointed out that this labor-saving method of treating sheep will apply just as satisfactorily on the small farm flock as on the large ones. He said that the sheep industry each year threw away thousands of dollars because nodular disease destroys lamb casings for surgical sutures.

Mr. Elling states that in waging a control program on nodular and other intestinal parasites, flock owners must be persistent. He suggests using, in combination with the feed treatment, given just prior to turning out on spring pasture, a salt lick to which has been added a phenothiazine powder.

How Big a Hay Crop?

A little record keeping on spring rainfall might pay this year. Comparison of the figures with normal can give a farmer a pretty good idea of the roughage program he should follow the rest of the year. The weather bureau in a long-range study completed late last winter found that rainfall from March thru May determines pretty well the size of the country's hay crop. Years of heaviest rainfall in the 3 spring months have been years of heaviest hay production. Just as surely, years of lowest spring rainfall have been years of lightest production.

Each additional inch of spring rainfall means about 10 to 11 million extra tons of hay. There is a tendency for farmers who get a short first cutting to say: "Well, maybe we'll get a heavy second cutting." The figures prove a springtime deficiency seldom is made up, because the deficiency results in subsoil moisture reserves being pulled down. Hot weather prevents them from being restored.

—Capper's Farmer

Fur from Farm Lands

Condensed from Soil Conservation

Philip F. Allan

Senior Biologist, Soil Conservation Service

THE wild fur-bearing animals have always played a role in the economy and development of the Nation. The earliest explorers of the West were trappers, many of whom, like Kit Carson, became the guides to those who started the pioneer agriculture in the Louisiana Territory, the Great Basin, and the West Coast.

For many years so intent was the Nation on producing cultivated crops and domestic animals that wild crops suffered from lack of attention; and, what was worse, from misuse of the land. The conservation of soil and moisture and the adaptation of crops to the types of land most suitable for their production tend to restore to wild animals a place to live. Today the fur bearers, fish, and game are finding a place in diversified agriculture and in no small way are contributing to farm income.

Wartime conditions have made it important to utilize all sources of food and other useful products of the land. Fur-bearing animals that can be produced on farm lands provide furs useful to the armed forces and civilians alike. Members of the United Nations' merchant marines, war workers constructing the Alaska highway, and civilians on war jobs in Alaska, Greenland, and Iceland, use fur garments. The Army uses wolf and raccoon skins to a limited extent for linings of high-altitude and arctic garments and is testing a number of other furs for more extensive use.

Trappers and hunters are being urged by State conservation departments to save fat from animals. Enough glycerine can be obtained from 100 pounds of ordinary animal fat to make 25 pounds of nitroglycerine. Some fur bearers also supply considerable quantities of palatable food. Muskrats and raccoons are sold for food and many opossums are eaten.

Furs are an important wild product of agricultural land and provide a wartime crop from types of land often otherwise unproductive. Many parts of the farm contribute to their production, particularly areas not useful

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for cultivated crops, forage, or wood products. Protection of suitable fur-bearer habitats, along with other rather simple management measures, contributes to yields of the fur crop without the expenditure of a great deal of time and effort on the part of the farmer or rancher. On parcels of wildlife land, the production of fur bearers takes an important place along with the management of those lands for edible wild fruits, honey plants, and the development of ponds for a handy supply of good fish.

Stream and drainage-ditch banks, marshes, swamps, overflow lands, lakes and ponds, hedgerows, rock outcrops, old strip mines, abandoned quarries, cliffs, and box canyons dot the farms and ranches of the Nation. Although they often are considered "idle" or "waste," they are in fact wildlife lands.

By virtue of numbers taken annually, the most important of the fur bearers are (1) muskrat, (2) opossum, (3) skunk, (4) raccoon, (5) mink, (6) weasel, (7) fox. The first five are most susceptible to increase through land management. Their abundance and widespread distribution also permit broad, general recommendations. Some other farm fur bearers which may be increased by land management practices are discussed briefly.

Farm lands in the United States produce more furs than forests and wilderness, acre for acre, and the wildlife lands on inland farms sometimes outyield even the coastal marshes.

The fur animals, although they may range the woods for beechnuts, dig pasture grubs, or eat waste corn, generally make their homes in little-used parts of the farm. As the ordinary practices of farming encroach upon wildlife lands, the numbers of fur bearers diminish. The grazed stream bank, for example, supports few muskrats, minks, and raccoons, but well-protected stream banks are favored by these animals. The stream margin, in fact, is one of the most productive fur-bearer habitats on farm land. It is sometimes rivaled by ponds, well-vegetated drainage ditches, and woodlands.

Often simple developments, designed to control erosion or to put other land to better use, make wild-life land habitable to fur bearers. Annual yields comparable in value to those of arable lands are not unusual on the wildlife land of the country. Consider a farm pond that produces $10 worth of fur per acre in addition to other uses at no outlay beyond the time and small expense of trapping. One published record shows 75 cents per hour return after costs of traps and other expenses were deducted—

$97.50 profit from each $100 worth of fur taken.

A woodland or an orchard will produce some timber or fruit with no management at all. As the care these areas receive becomes more intensive, the yields become greater. Wildlife lands with no management now produce most of the Nation's fur crop, but the improved marsh may yield two or more times more pelts than an unmanaged marsh. The following management measures, listed in approximately increasing complexity, indicate how various kinds of land may be managed to increase the number of farm fur bearers. Few farmers are likely, at present, to manage a single species intensively enough to justify the presentation of material on muskrat management or mink management even if biologists knew how. Many, however, are prepared to manage their land, about which much is known, if they can do so economically and realize a profit on their invesment.

If only the simplest measures are applied, increased yields of furs will generally result. Whether the land is in marsh, rock outcrops, gullies, or woodlands the easiest practices to apply are the protection of the vegetation from uncontrolled fires and from grazing by livestock. These lands can be protected from fire by refraining from burning them entirely or by burning only when conditions are suitable. Accidental fires should be put out, and firebreaks may be plowed or established by controlled burning or ditching at suitable locations. Grazing is most effectively controlled by fencing, but if areas are to be grazed, livestock numbers should be limited to reduce damage to food supplies and burrows of fur bearers. In the case of streams and ditches the conversion of adjoining lands from pasture to crops will provide protection where those lands are suitable for crop production.

MARSHES

Practice controlled burning.—Controlled fires are useful in maintaining desired types of vegetation in some kind of marshes. This kind of burning also permits greater freedom of travel in the marsh and is thought by some to produce greater growth of vegetation. Marshes should be burned only when accumulations of dead plant litter are sufficient to fill shallow water areas to the point where these areas are not readily usable by muskrats.

At the time of burning, the ground should be saturated with water, and plant crowns, rootstocks, or other reproductive parts of the plants must be sufficiently covered with water not to be killed. Fires are more easily

controlled when winds are light or when the weather is damp. There should be an adequate system of firebreaks and sufficient help to keep the fire under control. Muskrat houses should be protected and scattered clumps of vegetation left unburned for animals to use as cover. Controlled burning is not of any particular benefit to fur bearers other than the muskrat.

Construct ditches. — Ditching opens the marsh to muskrats, provides somewhat greater uniformity of water distribution, and supplies spoil banks in which muskrats burrow. Ditches can be made in many ways. Blasting is one of the fastest and cheapest ways of ditching and, if properly done, will leave spoil banks. Propagating charges of dynamite permit the construction of long ditches at one time. Draglines likewise are used as a fast and relatively cheap ditching method. This method also provides spoil banks. Sometimes a special turning plow or ditcher and a marsh tractor are used in large marshes, and the earth removed from the ditch is piled on either side. In small marshes a horse-drawn or tractor-drawn slip scraper may be used, and hand-dug ditches can be built if one has the time. Sometimes special excavators are used on the coastal marshes.

Ditches in the North may need to be 3 to 4 feet deep. Shallower ditches 1½ to 2 feet deep are suitable in the South. They should be at least 2 to 3 feet wide and have a 1 to 2 foot spoil bank (banks on both sides are most desirable). In places likely to be flooded, spoil banks should be high enough to afford refuge for fur bearers. High spoil banks of peat, however, are likely to dry out and be destroyed by fire. Usually ditches should have no grade or should be blocked at intervals to prevent drainage. The most suitable pattern for ditches will vary with the site, but the most desirable distance between small ditches ranges from 50 to 150 feet. Large ditches, up to 16 feet wide and 4 feet or more deep, are sometimes used in the coastal marshes but they are expensive. In the average marsh on farm land the small ditch is most satisfactory.

Control water levels.—Water-level control is usually handled by dikes or by levees and gates. The water table is maintained at or near the ground level. The methods of flooding marshland are by damming, diverting water from streams, or pumping water from nearby lakes or rivers. Engineering assistance generally will be needed for the installation of water-control devices. All of them are likely to be expensive, and the cost may not be justified unless returns from furs can be depended upon.

The muskrat principally benefits from water-level control.

STREAMS AND DITCHES

Develop and maintain vegetation on the shores.—The easiest way to develop and preserve the vegetation is by protecting it from livestock and from fire. On the banks of streams and ditches marsh and shoreline plants or shrubs such as rushes, arrowheads, cattails, barnyard grass, and bush willows may be seeded or planted. Where trees cause bank cutting or shade out desired shrubs, grasses, or rushes, they should be cut. However, den trees (8 to 10 per mile) and fruit-producing trees and shrubs such as persimmon, pawpaw, plums, and haws, should be preserved along the streams.

Plantings will benefit muskrats. Den trees and fruit-bearing plants are useful to raccoons, opossums, and skunks.

Build stream-protecting structures and dams.—Small dams are used on small meandering streams to create marshes in low spots. Erosion-control structures of loose rock, log cribbing, or piling may provide den sites for minks. Structures on streams generally require careful building and should be constructed with the advice of engineers. Dams built by beavers will improve streams for other fur bearers. The principal fur bearers benefited by dams and other structures are muskrats, minks, and raccoons.

LAKES AND PONDS

Establish herbaceous vegetation on the shores.—As with streams and ditches, the first step in improving lakes and ponds is to develop and maintain suitable vegetation. Here herbaceous marsh and aquatic plants are most desirable. They may be established by protection of the shores from livestock and prevention of burning, by seeding or planting of desired species, and by the removal of unneeded trees and other competing plants. All the farm fur bearers discussed find such vegetation to their advantage.

Make shallows in strip-mine ponds.—Shallows in strip-mine ponds are needed for the development of vegetation, and they may be made by concentrating runoff water at suitable locations to form deltas or by bulldozing or scraping earth from the spoil banks. Acidity or a poisonous condition of the water may prevent plants from growing readily. Liming or other treatment may be needed to offset this condition. Muskrats, minks, and raccoons are common along well-vegetated strip-mine ponds.

ROCK OUTCROPS, GULLIES, BOX CANYONS

Establish vegetation. — The simplest protective measures usually are sufficient to develop and maintain vegetation, but sometimes it is necessary to build diversion structures to prevent rapid runoff of water through gullies and thus enable plants to get a foothold. Suitable herbaceous or woody food and cover species may be planted although they are seldom needed on rock outcrops such as knolls, cliffs, and escarpments. The fur bearers usually benefited by treatment of these areas are skunks, opossums, and raccoons.

CROPLANDS & PASTURES

Develop hedges and field borders. Fur bearers frequent hedges and field borders and if the hedges contain fruit-bearing shrubs the animals will utilize the fruits. Ordinary management such as cutting out large trees, particularly if it maintains the hedge or border in shrubby and perennial herbaceous growth, is all that is needed. These areas should not be burned.

Develop odd corners. Small rock outcrops and odd corners which cannot be cultivated are common in cropped fields and in pastures. If these outcrops and corners are borders, the vegetation most suitable for fur bearers ordinarily will come in. Field stones, stumps, and brush may be disposed of there in piles to the benefit of such fur bearers as skunks, opossums, and raccoons.

Develop permanent vegetation on drainage and irrigation ditches.—Burning is commonly practiced to control weeds along drainage and irrigation ditches on cropland. This harmful practice is a sure way to maintain weeds because perennial grasses and other useful plants cannot become established. Weeds should be moved each year before seed matures until permanent vegetation comes in. Grasses, legumes, or other plants may be planted to assure a growth of desirable species. The fur bearers benefited by this practice are muskrats, minks, and skunks.

WOODLAND

Practice woodland management.—Raccoons and skunks, and in some instances, other fur bearers are generally more abundant in ungrazed than in grazed woods. Any of the measures recommended as good woodland management such as selective cutting, timber-stand improvement, and prevention of fire will prove beneficial to fur bearers.

Develop shrub borders.—Fur bearers show a marked preference for woodland edges. If the woodland has a shrubby border, the food and cover plants are

much utilized by wildlife. Releasing shrubs by cutting out trees where they encroach on fields at the wood's edge for 15 to 30 feet is one of the simplest methods of producing shrub borders. Desirable species of shrubs may be planted. Skunks, raccoons, and opossums usually will be found along woodland borders.

Leave den trees and potential den trees.—Probably the most important single measure for raccoons is protection of their den trees. These are commonly cut by 'coon hunters or by farmers because the tree has little timber value. Since it requires 70 or more years for a den tree to develop and 25 or more years for the cavity to form it is short-sighted to cut it to remove raccoons. Furthermore, it is sometimes equally poor economy to cut a useful den tree for woodland improvement, because the tree may produce a greater value in furs than its wood and space are worth annually. One den tree per 10 to 15 acres will maintain a good population of raccoons. About twice as many trees which show signs of becoming den trees should be preserved. That is, 1 per 5 to 7 acres. Thus, there will be ample replacement for dens no longer useful. A thump with an ax will reveal hollow tree trunks and branches, in which a hole may be chopped to open the tree for denning. Raccoons and opossums will benefit from the protection of den trees.

Portable Concrete Floors

When Max Eifert and Son need a floor for a self-feeder or a hog waterer, Robert Eifert, junior member of the partnership in Ingham county, Michigan, loads up some homemade concrete slabs and has it laid in 30 minutes. He has a form in which he makes blocks 2½ by 12 by 24 inches. The form consists of 4 hardwood 1-inch boards, with hinges at 3 corners and a hinge hasp at the other. The mix of 3 parts pea-size gravel, 2 of sand and 1 of cement is made dry enough to tamp, and the form may be removed at once. A piece of wood, 1 inch square, attached inside the ends of the form, provides handholds in the blocks.

—*Capper's Farmer*

Pigeons for Profit

Condensed from New Jersey Farm and Garden

C. S. Platt

ONE phase of agriculture that has not received very much attention is that of squab production. No doubt this is due to the fact that the business is a specialty, requiring considerable knowledge and a willingness on the part of the flock owner to pay attention to the details of marketing as well as production.

Under most conditions the squabs are sold after being killed and dressed which adds a feature that is not too desirable in comparison with a farm devoted to the production of eggs from chickens, or even broilers which usually are sold on a live basis. However, some squabs are sold by live weight so that the killing and dressing does not need to be an essential part of the work of a squab farm. Regardless of *the* method used for disposing of the squabs, the market outlet must receive consideration when locating a farm for squab production. In some localities the demand is not great enough to absorb more than a limited supply. It is always advisable to have a market outlet arranged for before starting out to rear any great number of squabs.

In contemplating the possibilities of squab production, one of the first questions that arises is how many squabs can be sold in a year from a pair of pigeons. Accurate records on this point fortunately are available, as the New Jersey Breeding Test at Millville has been gathering information along this line for several years. In general it can be stated that the production will tend to average twelve squabs a year per pair of pigeons. Some pairs will produce sixteen, eighteen or even twenty squabs a year, but on the other hand some will not produce more than six or eight squabs. As the productive ability of the stock cannot be foretold, the owner is obliged to keep all the pairs he raises for at least one year and even then he can hardly afford to dispose of the poorer ones, as often a pair improves in its production the second year.

If poor results are obtained for two years in succession the pair of pigeons concerned either should be broken up and the mates switched with another pair that has not proved good or else both pairs should be sold. Good pairs may produce for several

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years at a fairly steady rate and such stock certainly should be kept. In the breeding test mentioned previously the policy is to keep the better stock year after year and at this writing the best pairs have produced just about seventy-two squabs in six years or an average of one squab monthly for that period.

Answering the question as to the worth of squabs is just about as easy as predicting when the war will end!

In periods of depression they sold for as low as twenty-five cents a pound, which is the approximate weight of one squab. During the past year prices have been nearer seventy-five cents a pound. Probably it would be safe to suggest that an average of forty cents a pound might be expected over a period of years. To really be profitable a price in excess of that figure is necessary, however, and at the present time with feed at high levels there is not too much to be made even with squabs at seventy-five cents.

It takes about eight pounds of feed to produce one pound of squab, thus making the feed cost almost thirty-five cents for each squab. And feed cost is not more than half the total cost, counting replacements, taxes, repairs, labor, etc., so the net profit at the present time is hardly high enough to suggest that many go into the squab business. The future may be good, however, as there has been a reduction in the number of squabs being produced throughout the country and a definite shortage no doubt will prevail in the years immediately ahead. With a good demand and a short supply, squabs may be worth more in relationship to feed after the war than they are at the present time, even at lower prices. However, no one can predict what will take place and the best way to judge the worth of squabs is to recognize the fact that they should sell at a price per pound at least fifteen times the price of feed per pound.

About the best procedure to follow in feeding pigeons for the production of squabs is to give the birds all the feed they will eat up readily in a period of a half hour in the morning with a similar feeding in the late afternoon. Some feed may be in the hopper during the day, although there is a tendency for the birds to waste feed if it is supplied too abundantly. Research work at the Experiment Station has shown that the several grains used for pigeon feeding can be fed separately on a cafeteria basis with success, but the practice is not to be recommended as there is a tendency for the birds to eat too much of the more expensive grains. Under conditions where the owner cannot be present at specified feeding times, the cafe-

teria system may be used however.

A satisfactory mixture of grains for pigeon feeding consists of 300 pounds of whole yellow corn, 150 pounds of cracked yellow corn, 150 pounds of Kaffir corn, 200 pounds of wheat and 200 pounds of peas, either the Canadian Field Pea or the Alaskan Green Pea.

In addition to the grain pigeons must receive grit and for this purpose there are many good commercial grits on the market.

Squabs should be removed from the nests and sold when they are about four weeks old. The proper time is just when the feathers are almost fully grown, or at least after the bird has passed the pin feather stage as judged by looking under the wing. If allowed to stay in the nest too long the squabs will lose weight so it is important to check over the loft at least once weekly and remove all squabs that are ready for the market.

When the squabs are removed from the nest a record should be made in the pen so that the better pairs can be located when the time comes to save some of the squabs for later use as breeders.

A pair will keep its same nest throughout the year so if the owner knows how many squabs are removed from a particular nest he has an accurate record of the production of the pair using that nest. The birds themselves actually need not be numbered in so far as the records are concerned. Squabs to be reared for breeding purposes should be saved during the months of April, May or June so that they will be matured and ready for production the following winter. Throughout the remainder of the year the squabs should be marketed.

As a rule about one-fifth of the flock will need to be replaced annually, although in some lofts the turnover may be at a more rapid rate. In order to have a guide as to normal flock production the following table represents the record of the pairs at the New Jersey Test during 1940.

Seasonal Production Per 100 Pairs Adult Pigeons

Months	Eggs Laid	Squabs Hatched	Squabs Sold
Jan., Feb., March	416	303	216
April, May, June	521	396	326
July, Aug., Sept.	402	379	399
Oct., Nov., Dec.	428	303	293

A loft maintaining a seasonal standard as shown probably would not contain very many poor pairs of pigeons. On the other hand if the production was less than the records given the loft should be culled over to find the pairs that were not in production. This would be especially true during the spring and summer when even the poorest stock should be in production.

Good Feeding for Efficient Performance

Condensed from Guernsey Breeders' Journal

W. E. Krauss

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THE great need for milk places a responsibility on the dairyman that can only be met under present conditions by operating at a high degree of efficiency. In order to do this animal health must be kept at a high level. Proper feeding, good sanitation, and sensible management are three most useful tools for preventing physical breakdown and making maximum production possible.

A nutritional deficiency is an abnormal condition brought about by lack or insufficient intake of one or more food nutrients, or even by an unbalanced intake of nutrients. It may manifest itself by readily recognizable physical symptoms such as scours, watery eyes, and stiffness, or by inferior performance, such as retarded growth, lowered milk production, and abnormal calves.

In addition to water, the feed nutrients needed by dairy animals are carbohydrates (starches, sugars, fiber), fat, protein, minerals and vitamins. Of these, the groups in which some constituents are most apt to be lacking in the feed are the minerals and vitamins. If the animals actually are underfed, any or all of the other nutrients also may be consumed in too small amounts to afford protection. This latter situation should prevail but rarely and then only through ignorance, neglect, or actual shortage of feed.

Although it is known that dairy cattle need about a dozen different minerals in their feed the ones most apt to be deficient are calcium, phosphorus, and iodine. In some parts of the country where the soil is deficient in iron, copper, cobalt and manganese these minerals may need to be added to the ration of natural feeds. As evidence accumulates regarding these rarer minerals their importance may be emphasized and more general need for supplementing rations with them be recognized.

Calcium and Phosphorus. Since it is in keeping with good farming practice, every effort should be made to have the mineral supply come from the feed con-

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sumed. Legumes and legume mixtures are excellent sources of calcium and ordinarily will supply adequate amounts of this mineral except when milk production is quite high and when young calves receive little or no milk. When non-legume crops are used as the principal source of roughage, calcium intake may be inadequate and a calcium supplement indicated.

Phosphorus may be a limiting factor even when legume roughage is used, for on many soils available phosphorus is low and the crops grown on them are consequently also low in this element. Wheat bran, wheat middlings, and high-protein feeds like cottonseed meal, linseed meal and soybean meal are good sources of phosphorus. The importance of feeding concentrates as a source of phosphorus thus becomes apparent.

When legume roughages are not available or are limited in supply some calcium supplement should be used. When calcium only needs to be supplied, ground calcium carbonate (ground limestone) or oystershell can be used at the rate of one per cent of the grain mixture or be fed free choice.

When phosphorus is to be added, bone meal, dicalcium, disodium or defluorinated rock phosphate may be offered free choice or incorporated in the grain mixture to the extent of one per cent. Since these phosphorus carriers (except disodium phosphate) also supply calcium the need for both minerals will be satisfied when they are used.

Calcium and phosphorus supplements usually are unpalatable and should be mixed with salt when fed free choice.

Salt. Salt is needed by all livestock. Ordinarily one per cent of salt in the grain mixture will be adequate but salt should be offered free-choice regularly to insure an adequate intake. A good procedure for supplying salt, calcium and phosphorus, is to mix one or two parts of the calcium and phosphorus containing minerals with one part of salt and place in a box that is readily accessible. When heifers and cows are on pasture minerals should always be offered in this way. The box should be so constructed as to afford protection to the contents from wind and rain.

Since the only time a cow has much opportunity for building up mineral reserves is during the dry period, the feeding of high-phosphorus high - calcium feeds or mineral supplements is particularly important during this time.

Iodine. In some areas of the United States the soil and water are seriously deficient in iodine. Livestock fed largely on feeds

grown in such areas may develop iodine deficiencies which, in the case of dairy cattle, would become apparent by the presence of goiter in new-born calves. An inadequate intake of iodine may exist and efficiency of performance lowered without goitrous symptoms. In goitrous and semi-goitrous areas, therefore, iodine should be provided as a supplement. The simplest way to do this is to use commercial iodized salt (stabilized); the cheapest way is to add one ounce of powdered potassium iodide to 300 pounds of ordinary feeding salt. Because of the important functions of iodine it is possible that to use iodized salt for dairy cattle universally may be as desirable as in the case of humans.

Other minerals—Iron, Copper and Cobalt. Iron, copper and cobalt are interrelated in that they all contribute toward maintaining a healthy blood picture. Iron and copper are known to be needed for blood formation and when they are deficient anemia develops. Nutritional anemia in cattle has been found in Florida and cured by adding iron and copper to the ration. More recently, lack of cobalt has been shown to be involved in this type of anemia and also in the development of an emaciating anemia known as "hill sick" or "salt sick" in Florida and "Grand traverse" or "lake-shore disease" in Michigan.

Prevention of these difficulties in soil-deficient areas consists of adding one pound of cobalt cloride to cobalt sulfate to each ton of the regular salt sick mineral mixture (100 lbs. of salt, 25 lbs. of red oxide of iron, and one lb. of powdered copper sulfate) and offering this mixture at all times.

General use of iron, copper and cobalt supplements is not indicated.

Manganese. Manganese has been shown to be an essential mineral for proper nutrition of small animals. Lack of this element results, among other things, in irregularities in the breeding cycle. It is known that the manganese content of roughages varies considerably with location, and preliminary work at the University of Wisconsin suggests some relationship between low manganese intake and reproductive difficulties in cattle. At the present time, however, no recommendations regarding the feeding of manganese to dairy cattle can be made.

Vitamin Deficiencies

Dairy cattle and other ruminants do not have the need for many of the vitamins and vitamin-like factors required by hogs and poultry. This is due to the ability of the first compartment of the stomach (the paunch or rumen) to manufacture practically all of the factors of the vitamin B-complex, and to the fact

that roughage is consumed in such large quantities. Except in the case of calves under eight weeks of age, good quality roughage and grain will supply the vitamin needs of dairy animals under most circumstances. As the quality of the roughage goes down the amounts of vitamins A and D in them also decrease. Body needs may not be met as a result and the milk produced will have a low content of these two factors. Young calves often do not consume sufficient roughage to supply adequate amounts of vitamins A and D and unless the milk they consume supplies these factors a deficiency may develop. Also, because the rumen probably is not developed enough to permit manufacture of the B-complex vitamins, calves under eight weeks of age may need special feeds like alfalfa leaf meal and yeast or even special vitamin supplements.

Vitamin A. Green feeds, hays that have generous amounts of visible green, corn silage, hay silages and yellow corn are the materials from which cattle get carotene, the yellow pigment that serves as a source of vitamin A. Pasture serves as nature's carotene patch. To be able to pasture early in the spring and late in the fall would help solve the winter vitamin A supply problem as this shortens the period during which the animals must depend upon liver storage to supplement the often low intakes of carotene from hay that has been stored in the mow for several months or more. Corn silage carries considerable carotene if it is not ensiled too late and properly made hay silages as a rule are good carotene sources. Making maximum use of pasture and feeding good quality hay and silage liberally should insure adequate intakes of vitamin A for heifers and mature animals.

Vitamin D. This is the other vitamin that must be supplied in the feed or by the action of sunlight on the animal's body. Sun-cured hay contains enough vitamin D to satisfy the needs of animals over two months of age or from the time they consume two or three or more pounds of such hay daily. Calves under two months of age should receive a vitamin A and D supplement of fish liver oil, or alfalfa leaf meal as a source of vitamin A and irradiated yeast or other vitamin D-containing materials as a source of vitamin D. This will be particularly beneficial during the winter when the amount of these vitamins in milk is low.

Vitamin C. Even though cattle synthesize vitamin C the blood and urine of cows and the blood, urine, and semen of bulls with poor reproductive histories have often been found to be low in vitamin C. This cannot be cor-

rected by feeding vitamin C as this vitamin is destroyed in the paunch. Vitamin C must, therefore, be injected, or a vitamin C - releasing substance called "Chloretone" fed. Carotene fed at a high level also has been shown to be beneficial. This should emphasize the importance of feeding good roughage to bulls.

Sulfur Treatment for Coccidiosis in Lambs

Condensed from The Dakota Farmer

GROUND crude sulfur added to the feed of lambs in proportions ranging from 0.5 to 1.5 percent of the ration will prevent the development of coccidiosis, a parasitic condition that often has serious, if not fatal, consequences. The value of sulfur for this purpose was determined by experiments conducted by the Bureau of Animal Industry of the U. S. Department of Agriculture in co-operation with a large feeding establishment in Nebraska.

The recent experiments that disclosed the value of sulfur for controlling coccidiosis involved the use of 1,400 feeder lambs. They were divided into 14 groups of 100 lambs each and all were exposed to natural coccidial infection. Their feed consisted of a mixture of chopped alfalfa hay and ground corn, moistened with molasses and water and fed in long troughs. All groups received as much of the mixture as they would eat.

The ration of 8 of the 14 groups was medicated with varying quantities of sulfur for the duration of the test, which lasted 72 days. The remaining groups received feed which was untreated.

When sulfur was fed in proportions exceeding 1.5 per cent, it had an objectionable laxative effect and the lambs did not gain or put on market finish as well as the other lambs.

Lambs receiving 0.5 to 1.5 per cent sulfur in the ration continuously for 72 days had a remarkably low death rate, remained in good health, and fattened well. Further studies are necessary to determine the best quantities to use within the 0.5 to 1.5 per cent range for different conditions and degrees of coccidial infection.

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Hothouse Tomatoes Set with Spray

Condensed from Market Growers Journal

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CHEMICALS have been used for several seasons to set tomatoes; however, there still remained some question as to the most applicable commercial method to be used. A study of the effects of using a number of the more recently recommended materials at the University of Wisconsin has given results which have shown a practical procedure to be followed.

Effects of Spraying

A list of the important results of applying chemicals to tomato blossoms in the form of spray follows:

1. Only certain types of blossoms can be set with chemicals. Fortunately, the "vegetative" blossoms of over-vegetative plants which do not set well with pollen do develop fruits after spraying.

2. Blossoms on weaker plants, which tend to absciss and do not set with pollen, cannot be set with chemicals.

3. Spraying sets fruit over a wide range of blossom development; from four to five days before full blossom to as much as two weeks after full blossom.

4. Smaller fruits result when too young blossoms are sprayed.

5. Sprayed fruits are seedless only when not pollinated.

6. Several forcing varieties all set "perfectly" with spray—that is, when either vegetative blossoms or those which set well with pollen are treated. A partial exception might be in a sort that has abortive petals tightly surrounding the pistil so that the spray cannot penetrate to the ovule. These extremely vegetative types will set if the ovules are really wet with chemical solution.

7. Sprayed fruits have normal size, shape and quality with the exception that the seed cavity area is sometimes greenish in color. Hollowness is too infrequent to be given notice, especially if the rough first blossom on some clusters is picked off.

How to Spray

From the above list of effects, a procedure is naturally suggested. In the first place, since blossoms can be set on very vegetative plants, this type should be grown as such plants can be

Reprinted by permission from the Market Growers' Journal, Louisville, Ky., May, 1944

maintained in good vigor long enough to set a maximum crop. When pollen is depended upon for fruit set there is always the danger of getting the plants too vigorous. When plants are started with less vigor too few clusters can be set before the plant "matures."

As blossoms can be set for many days after the full blossom stage, the spraying should not be done until several blossoms of a cluster have opened. One thorough spraying at this delayed stage sets a full cluster at one time and gives relatively uniform sized fruits. This is an important advantage of the spraying method.

Spraying need be done only every four to six days. Trial spraying can be done with a nasal atomizer. For commercial operations a knapsack-type sprayer with an angle nozzle and a solid, instead of a cone, spray is practicable. Several hundred plants can be sprayed with such a pump per hour. Thus, not more than one-quarter of the time is required for spraying than would be used to pollinate a similar number of blossoms with the required one or two visits each day. Thorough wetting of the ovules is necessary.

Beta naphthoxy acetic acid is suggested as a practical spray chemical. It is highly effective and does not distort foliage which is accidentally sprayed. This material is also cheap, costing only a few cents per gallon of spray. An effective concentration is three-tenths of a gram per gallon of spray. It can be purchased from special chemicals manufacturers such as the Eastman Kodak Co. The acid is slow to dissolve in cold water. Solutions several months old have set fruit as well as freshly prepared solutions.

One minor disadvantage of spraying is that the petals remain fresh and adhere for a considerable time and may serve as a source for the spread of rot to the fruits. The fruits pick harder. For some varieties this is an advantage.

One important factor, if fruits are set with spray, is to change the cultural conditions so the plants will maintain good vigor in the presence of the heavy sets of fruit on early clusters.

The method of setting fruit by "gassing" may be developed to commercial use. It has two objections: one is that many young blossoms would be set and smaller fruits secured from these. Also, blossoms in a wide range of development would be set, giving fruits of greater variability in size than where a single delayed spraying was used as the pollen substitute.

The present statements are based upon experience in Wisconsin where the greenhouse sea-

son and weather conditions are different from those in more southern latitudes. It is believed this should alter the results to be expected from the method outlined in only a minor way.

Grow plants which are too vigorous for successful setting with pollen and spray thoroughly several days apart. There is then the possibility of maximum production even on the winter crop.

White Pine Protected from Disease

Condensed from West Virginia Farm News

Ralph W. Welch
Charge Blister Rust Control

IN recent years, another of our most valued species of forest trees has been threatened with destruction or heavy damage such as that suffered by our native chestnut during the past three decades. In this case, however, due to the untiring efforts of the Federal and State governments, the ravages of a comparatively new disease have been checked and damage has been almost completely averted in some sections of the country.

The disease is known as "blister rust" and the tree attacked is white pine. Like the chestnut blight, blister rust is an introduced disease, first making its appearance in this country shortly after the beginning of this century. In the eastern United States, white pine blister rust began its spread in the New England States and has gradually swept southward until it is known to exist from Maine to North Carolina.

White pine blister rust, like so many of the rust diseases in the plant kingdom, requires two host plants upon which to live and spread until it is this factor that presents a weak link in the disease's ability to thrive. Besides its existence in the bark of the white pine tree the rust also attacks gooseberry and current bushes. Before it is able to attack white pine it must first pass through certain stages on the leaves of gooseberry or current bushes. The latter two plants, being of much less importance commercially than white pine, becomes the so-called weak link, and the uprooting and destruction of the gooseberry and current bushes growing within approximately 900 feet of white

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pine prevents the disease from attacking and ultimately destroying the valuable white pine trees.

In West Virginia, the Federal and State governments have been waging relentless war on gooseberry and currant bushes in twelve of the major white pine growing counties in the State and in the past ten years more than *six million* of these bushes have been uprooted and destroyed. The program is not considered as being expensive and some 300,000 acres of white pine land, whose value runs into the millions of dollars, have been protected from blister rust. Where white pine is closely associated with gooseberry or currant bushes, there is little doubt that the disease would take a heavy toll of white pine, eventually exterminating it, if the source of infection were not removed.

To date, initial protection has been given to virtually all of the major white pine stands in West Virginia. In many sections, however, where Ribes (generical name for the gooseberry and currant plant) were growing profusely when they were originally destroyed, it is necessary to reexamine the pine stands and rework those areas which have produced new Ribes growth from seed or root sprouts.

This past year, rework programs were conducted in the vast holdings of the Monongahela and George Washington National Forests, in Watoga and Droop Mountain State Parks, and on private lands in Pocahontas and Pendleton counties. Rework in Seneca State Forest has already been brought to completion. During the first eight months of 1943, 56,404 acres of control area have been reworked and 92,632 gooseberry and currant bushes (mostly wild) have been destroyed. It is pointed out that when the same acreage was initially worked five to seven years ago, approximately 300,000 Ribes were destroyed. From these figures it can be seen that the Ribes population is being rapidly diminished and that therefore the chances of blister rust infection on white pine and subsequent damage from the disease is being lessened. This, of course, is the ultimate goal of the program.

What Kind of Hog Is Best?

Condensed from Missouri Ruralist

IT always seems to the hog man that no matter what type, or weight, he sends to market, the buyers are paying best for something else. What king of hog is the best? What type hog does top the market and make most efficient gains? These are important questions for every hog producer to consider, whether he is a commercial or purebred breeder.

An "intermediate" type is the best for all-around purposes, says Prof. L. A. Weaver, swine specialist for the animal husbandry department of the Missouri College of Agriculture, and one of the best known hog judges in the country. Professor Weaver discussed at length his ideas on hog type recently.

Much progress already has been made in the right direction, he believes. Already most of our breeds are striving for a thicker, deeper hog, with good size without great long legs and necks. For some breeds this has meant a smaller hog, for others a larger one.

The great advantage of an intermediate-type hog is that much more leeway is provided the hog raiser in choosing a market time. The smaller, compact hog that nears its finish weight at 200 pounds or less makes inefficient gains with additional feed the producer may have to market. Thus if the producer would like to feed this kind of hog up to heavier weights he makes poor profit from his feed.

Likewise, the long-legged, rangy type of hog is not finished at handy weights of around 200 pounds, but requires more time and more feed to reach a market-topping stage.

But the amount of feed is not always the determining factor of when hogs should go to market. Ordinarily, there is a yearly cycle of hog prices as they go up and down in relation with supply.

The intermediate-type hog is fairly well finished at weights of from 180 to 200 pounds, but has the bone and size to put on additional pounds efficiently. Thus the use of such a type gives the hog raiser a longer period in which to choose a market time.

Purebred hog breeders have made great progress in producing the kind of hogs farmers can best raise and feed. Progress can be made rapidly with hogs because of the relatively short time required for each new generation.

A comparison of the all-Amer-

Reprinted by permission from the Missouri Ruralist, April 22, 1944

ican Duroc selections, with all-American choices of not so many years ago bear out Professor Weaver's statement. Greatest improvement has been made in the depth and width of body.

Virtually all of the swine breeds have emphasized type in recent years. Growth of the hog-type conference has brought together all pork-producing interests, packers, commercial raisers and purebred breeders.

Missouri's program of state sponsored shows and sales has not only made it easier for farmer-producers to get good-type hogs, but a sincere effort has been made to acquaint the entire industry with the fundamentals of good type.

The Berkshire breed last year tried out a system of classifying hogs in their national sales according to type. Judges viewed the animals a few at a time and scored them into one of 3 classes, according to merit.

But with all this work toward a better type, we still do not have the perfect hog. "What is the greatest danger?" Professor Weaver was asked. His warning was not to forget prolificacy, for without this, type might mean little or nothing.

"If we expect a sow to farrow a big litter we must not only choose a sow designed to produce them but she also must be equipped to care for them after they are born," he said.

"Never keep gilts that show only 10 nipples," he urged. "Still better than 12 are 14." The presence of plentiful nipples is not a sure sign of a prolific sow, but it is an indication.

"We must not carry the trend to quicker maturing hogs too far so that we have gilts too short bodied for prolificacy," the professor added.

It is obvious that emphasis should be placed on the part of the hog that brings the highest price, and that's the ham. Breeders have done a good job in general of getting their hogs to "ham down."

Pork chops bring a good price, too, and hogs that carry their width well are highly desirable. A place to look for weakness is right behind the shoulder.

With the passing of the "super" sow less trouble is experienced in broken-down pasterns and feet, but this still is a point to consider in selecting gilts. A hog's legs, like those of beef animals, should be "four-square" and straight. A weakness often noted today is crooked front legs. They may not only be "knock-kneed" but slope forward.

Another rather common fault is having too long a neck. This can be noted by checking on how much of the arch of the hog is in front of his shoulders. The other

end of the arch may be at fault, too. The rump may be either too sloping or too steep. Of the two faults, the latter is perhaps more common. The arch after all is the "brace" by which a hog supports its weight.

Too much emphasis is not placed on the head by Professor Weaver, neither is it overlooked. Mainly, it indicates quality. Big ears may not only keep you from driving a hog through a gate but they also indicate a coarse hog. No matter what the breed, the nose should not be too long.

Breed type is indicated by the head, too. After many sallies by various breeds toward special-type hogs it seems that today virtually all breeds are aiming at essentially the same type.

Good type alone without efficient management will mean little. But coupled with sanitation, balanced feed, and attention to details, type may mean the margin of profit.

Toads Deserve Protection

Condensed from Farm and Ranch

Elizabeth Lees

THE toad is the farmer's stepchild. Yet a toad may be worth $25 a year to a southwestern grasslands farmer through the large number of injurious insects eaten. And conservative estimates have been made of toad populations of over 400 of one species alone per acre in certain areas.

People are prone to value songbirds as paragons in their worm-munching ability and to visualize toads as small, repulsive animals of little harm but no great good. While it is true no toad is going to fly up into a tree and pick off a caterpillar, there is an entire fauna of night creatures which he cleans up on as friend bird sleeps peacefully.

These conclusions are the results of research done by Arthur N. Bragg, assistant professor of zoology at the University of Oklahoma. Dr. Bragg has studied toads for nine years and shows no signs of weakening. Through his work he has proved that toads constitute an important asset to farmers and gardeners, especially in the Southwest.

Toads have few natural enemies. They are attacked by a few parasites which live within their bodies but which do them relatively little harm. Large frogs and certain types of snakes eat them and crows sometimes kill the young. In the tadpole stage, toads are eaten by some large insects and fishes. The adults are

Reprinted by permission from Farm and Ranch, Dallas, Texas, May, 1944

usually immune from attack by larger animals through a secretion of the skin which is obnoxious to most animals. It may be noticed that dogs will not bother a toad after the first attempt.

They are protected from the excessive dryness and heat to be found in various parts of the United States by two habits. They breed and feed mostly at night and in daytime they rest well below the surface of the ground where it is moist and cool. The Rocky Mountain toad, the species of widest distribution, needs the least moisture of any Oklahoma species. The American toad, found in the East in great numbers, needs much more moisture than the Great Plains toad, a southwestern dweller.

Dr. Bragg has observed the diet of toads by watching them feed, offering them delicacies and noting those they prefer. He has also dissected captured toads and identified the material in their stomachs.

They feast on insects, spiders (including the poisonous black widow) and such creatures for the most part. No evidence has been found of toads eating vertebrate animals. Frogs are different. They are often cannibalistic and usually snap at any small moving object.

The same limitations that prevent the toad from having the glamor of the songbird also prevent him from dining on butterflies and the economically important bees. Beetles, ants, crickets and grasshoppers are exterminated by the thousands, however, by the toad. Junebugs, which attack the roots of grasses and grains, are one pest often effectively liquidated by toads.

Prof. A. H. Kirkland, of Harvard University, some 40 years ago estimated that each toad was worth more than $18 per year to the eastern farmer. He drew this conclusion from his belief that a toad fills its stomach four times a day. It is because of the large amount of preharvest harvesters eaten by toads that Dr. Kirkland placed the value of these ambitious amphibians at that price to the eastern farmer. It is Dr. Bragg's opinion that the southwestern toad fills its stomach only once or twice a day. However, the higher value given them in the Southwest by Dr. Bragg is justified by the larger sizes in this vicinity and two peculiarities of the region. Chinch bugs tend to be the biggest menace in this section of the country. Great Plains toads, who delight in chinch bugs, are also most numerous in the wide open spaces. This is a fortunate coincidence for the farmer.

Another scourge of the Southwest is the cutworm or larvae of certain moths. These emerge from the ground at night to feed

upon the vegetation. They come out in the spring when the plants are young and frail and hence are able to destroy completely much of the crop. However, it happens that the appetite of the toad is also stirred in the spring. He has been sleeping all winter and needs nourishment badly. Since insects are not yet abundant, he picks on the cutworms, and wholesale massacres take place. Dr. Bragg has taken a handful of cutworms from the stomach of a single toad.

Woodlots Yield Cash

Condensed from The Farmer

TAKE my experience now," said Bill Ferber, who farms a 200-acre place near Menomonie, Wisconsin. "We didn't think that 10-acre patch of woods was worth much on the market, but it was. I'm getting a check for $900 from Lawrence Munich, manager over at the Farmer's Union. That's for 15,000 board feet that'll be used for making veneer. They pay $60 a thousand for that, and I still have 10,000 feet of Number 2 stuff that'll bring me $30 a thousand so I have $1,300 extra off my place that I wasn't expecting this year."

Bill's experience hasn't been uncommon among Dunn County, Wisconsin, farmers the past few months for through Helmer Andersen, forester of the Soil Conservation Service and Martin Keliher, conservationist with the Service in Dunn County, there has been developed a market for timber formerly looked upon as hardly worth cutting. Elms, oaks, basswoods, and maples are going to veneer mills, if they are of such quality as is demanded for veneer, and if of poorer quality, they are used as railroad ties or lumber.

When Andersen and Keliher suggested that there was a chance to turn the hardwood trees into cash, they had doubts to overcome because a few farmers had had some unhappy experiences with trying to market logs. Mr. Munich, of the Farmer's Union, was called in and asked whether he would set up a log pool on land adjoining the Farmer's Union warehouse in Menomonie and he agreed to do that. Next step was getting in touch with buyers interested in the type of timber available. The figures brought together by Mr. Andersen were eye openers. In terms of board feet, No. 1 veneer logs

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were worth from $55 to $80 per thousand depending upon the species, the best hard maple taking the top price. Values graded down from that top through kinds suitable for ties, for lumber and for fuelwood.

When word spread over the county that there was money for farmers in the logging business there were demands for log yards elsewhere so five more were established.

Both Andersen and Keliher spoke at meetings throughout the county urging that farmers take from their woodlots the profit that was there, but that they use good judgment in cutting, taking only mature trees, leaving the immature ones for later harvesting. It was pointed out that a tree 12 inches in diameter at a point even with an average man's shoulders would yield about 50 board feet while one 20 inches in diameter at the same height would yield 275 board feet. It doesn't take so many years to get the difference in growth, it was argued, and although the price for timber products may be less in a few years, growth will have more than made up the difference in price. "Marketing 12-inch trees," says Forester Andersen, "is just like marketing 50-pound hogs. You are not getting as much as you should from them."

Harvesting the timber crop intelligently works hand in hand with soil conservation. The man who has had some profit from timber sees more profit ahead and is inclined to treat his woodlot as he would other profit producing land on his farm. Obvious to him is the fact that if grazing is permitted there is little or no reproduction of trees, that the older trees grow slowly, and that there is loss of soil on slopes.

One of the questions which frequently arose at meetings was whether or not there would be a market for these hardwood trees after the war. Now they are being used largely in war industries. Mr. Andersen and others interested in forestry are certain that there will be markets because research within the industry has uncovered many new uses for these woods.

At the moment the veneer from basswoods and hard maples is being used in airplane and boat construction. Peacetime use for basswood is for some grades of furniture and for the making of boxes. Hard maple flooring is always in demand. Ship construction and construction of bridges, box cars and truck bodies are taking much of the red and white oak, but there is peacetime use for box cars, bridges, and truck bodies, as well as for oak flooring, so the demand for oak will continue. It has been found that the veneer from elm has a lovely rib-

bon-like grain and even before the war it was being used in furniture. Its use will be continued as veneer, and as framing for upholstered furniture, and also for crating material.

The prospect for a continuing market is only one factor which is causing Dunn County farmers to look with more interest to the value of their woodlots. Another is the building material which they can take from these wood lots for use on their farms. For the flooring they need there is the hard maple, and white and red oak. The oaks, maple, birch, ash, elm, and basswood can be used for joists, framing, rafters and plates. Jack pine, cottonwood, basswood, maple, oak, and elm may be used as roofing boards, and some of these species may be used also for sheathing and sills.

Portable sawmills will be utilized in working the timber up for farm use. One such mill of a new design already is in use in Dunn County. Its inventor, C. D. Jackson, of Mondovi, Wisconsin, has been using this one for some time and has made machines of similar design that are being used in other states. There will be need for planers and other milling equipment so that materials coming out of the woodlots may be worked into exactly the kinds of lumber for which farmers have ready use.

Still another factor which encourages good woodlot management is that it provides profitable employment during the winter months. C. A. Timmerman, another farmer of near Menomonie, mentioned this factor. He had five acres of woods that he and his hired man, Raymond Harshman, began working up some time ago. Timmerman has a dairy herd so that winter chores take a great deal of time, but he and Harshman could get in a couple of hours work each morning and about three hours work in the afternoon. In six weeks the two of them working five hours a day cut $706 worth of veneer wood—mostly elm, and they have logs scaling about 3,000 board feet of lumber which will be used to build an addition to hayshed and about 100 cords of fuelwood they took from the tops of the trees. Maple and oak top fuelwood is worth $4 a cord on the farm, and elm is worth $3 so these two men's work yielded a good return.

What these Dunn County farmers have accomplished in making their timber crop profitable can be accomplished in many other counties of Western Wisconsin and Minnesota. All that is required is getting someone acquainted with the business to start the logs rolling, and long neglected woodlots will begin yielding profits.

Strange Feeds I Have Met

Condensed from The California Cultivator

W. M. Regan
University of California

AS the population of California continues to increase, more and more of the land now used for the growing of livestock feeds will be diverted to the production of crops used directly for human consumption; greater and greater will become the demand for livestock and poultry products; and more and more will the by-products of industry be relied on to fill this gap between the demand for and the production of livestock feeds.

Stockmen have neither the time nor facilities to determine or evaluate the feeding worth of these new materials. In anticipation of the demand for this service by the livestock industry, the university through its division of animal husbandry has, for many years, followed the policy of determining, through digestion trials and feeding tests with animals, the approximate worth of these new materials. Many of the feeds listed in this article were tested for the first time in our laboratories. Because of the acute feed shortage at this time, many new and strange materials are finding their way onto the market, and a brief description of each will benefit the feeder who may be meeting the feed for the first time.

Kapoc Meal. A few years ago this meal, a by-product of the manufacture of oil from the seeds of the kapoc tree, was offered for sale in considerable quantities for the feeding of cattle. Our attempt to carry on a digestion trial was unsuccessful because we could not induce the test sheep to eat it. Poor palatability definitely rules this material out as a feeding stuff. Dairy cows refused a concentrate mixture containing 30 per cent kapoc meal.

Avocado Meal. The oil of the avocado has a special value in cosmetics. In the late 1930's the Calavo Growers of California began to crush surplus and off-grade fruits. The oil was solvent extracted. The residual meal proved fairly palatable. According to our digestion trials, this meal, when fed to sheep and cattle, is about equal to a good quality hay. It contains 9 per cent digestible protein and 5 per cent total digestible nutrients.

Artichoke Silage. In those sec-

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tions of California where the globe artichoke is grown intensively for human consumption, hundreds of thousands of tons of material, stalks and unmarketable heads remain in the fields each season. Some livestock feeders in these areas have been preserving this residue in silos as cattle feed. We found this silage to be quite palatable to sheep and cattle; to contain slightly less than 1 per cent digestible protein and almost 16 per cent total digestible nutrients. Its value, therefore, is about equal to corn silage.

Babassu Meal. The small babassu nut, a native of South America, belongs to the same family as the coconut. Because of the high quality of its oil and the ease with which the nuts are handled, it finds favor with processors. The residue is almost identical in palatability and digestible composition to coconut meal. The results of our trials show 21 per cent digestible protein and 80 per cent total digestible nutrients. An unusually high magnesium content, about 1 per cent, makes the meal more laxative than coconut meal.

Fenugreek Meal. Ground fenugreek seed has long been used as a condiment in proprietary feed mixtures. The increased demand for vegetable oils led to the pressing of fenugreek seed. The meal was suggested as a feed for livestock. Because of its exceedingly laxative effects on the test sheep we were unable to complete a digestion trial.

Dried Coffee Pulp (Coffee Bran). A by-product of the processing of coffee is the pulpy covering of the coffee berry. In an attempt to find a satisfactory outlet for the disposal of this residue the Nicaraguan Consul had a supply of the dehydrated material forwarded to Davis for testing. Our preliminary trials showed it to be quite palatable. Sufficient material was not available for digestion trials. Its chemical analysis, however, indicates a feeding value equivalent to a good quality of hay. Further work is needed in order to establish more accurately the value of dried coffee pulp for livestock feeding. Coffee bran is now being quoted on the San Francisco market.

Dried Orange Pulp. In 1924 the manufacture of orange products from the surplus and cull oranges had increased to the point where the Exchange Orange Products Company was faced with the problem of disposing of several thousand tons of wet pulp annually at its San Dimas plant alone. Digestion trials with sheep and feeding trials with dairy cows conducted by us demonstrated a feeding value equivalent to that of dried beef pulp. Its digestible composition is protein 6 per cent and 78 per cent total digestible

nutrients. Dried orange pulp is now being sold on the open market for $45 per ton. A waste product once a liability but now a a valuable asset to the orange growers, has contributed materially to our feed supply. Later trials have shown lemon and grapefruit pulps to have nutritive values similar to that of orange pulp.

Dried Asparagus Butts. In the refuse from our great canning industry lies another potential source of animal feedstuffs. Asparagus canneries seeking relief from a ban against the dumping of waste in the rivers furnished us with a supply of their dehydrated residue. Digestion trials with sheep show dried asparagus waste to be only fairly palatable and to be worth about as much as a fair quality of oat hay.

Dried Olive Pulp. There is annually a large tonnage of residue from the manufacture of olive oil. This material which contains about 60 per cent indigestible pits was found to be extremely low in digestibility. In feeding value it is about equal to straw. Unless the pits can be removed, this material is of doubtful value as a livestock feed.

Dried Pineapple Pulp (Pineapple Bran). The residue of the pineapple canneries, consisting of the skin, trimmings, core and ends of the pineapple from which the juice has been extracted, has been dried and marketed as a feed for livestock. Before the war, somewhat more than 5000 tons of this dried material was produced annually in the Hawaiian Islands, about half of which was shipped to California. The first digestion trial on this material was conducted at Davis. The animals ate it readily and it was found to contain about 1 per cent digestible protein and 60 per cent total digestible nutrients, thus being slightly less valuable than dried beet pulp.

Dried Winery Pomace (Grape Meal). Normally there is a vast tonnage of residue from California's wine industry. This material is being dehydrated and offered as a feed for cattle and sheep. Our digestion and feeding trials with sheep indicated it has a feeding value about equal to oat hay of from fair to poor quality. Its palatability proved to be rather low.

Acorns. There is a great difference of opinion among range cattlemen concerning the value of acorns. The following is the conclusion from a trial recently completed at the university's San Joaquin experimental range. "It seems evident, therefore, that a bountiful crop of acorns need no longer be regarded as a curse but rather as an additional source of feed that may be put to good use if supplemented with an adequate supply of protein." The

acorns used in these tests were from the blue oak (Quercus douglassii).

Flax Hulls. As a result of the rapid increase in flax acreage, thousands of tons of residual hulls are produced annually in California. Recent digestion trials conducted at Davis indicate their feeding value to be about equal to a poor quality of straw. They contained about 1 per cent digestible protein and about 35 per cent total digestible nutrients.

Carob Beans (St. John's Bread). The leguminous carob tree grows well in our southern coast counties. Each female tree yields from 300 to 500 pounds of pods annually. In a trial with calves conducted here almost 30 years ago, it was found that the ground beans with pods had a feeding value about like that of barley.

Mesquite Beans and Pods. This leguminous shrub grows in the desert sections of California. The ground beans and pods have a value somewhat under that of barley in cattle feeding.

Note on Feeding Bluegrass

Some years ago Dr. R. L. Humphrey of Round Hill, Va., took charge of the McLean race horses at Leesburg, Va. They were not winning races although well fed and trained. He took blood samples and Johns Hopkins found that all were deficient in calcium and phosphorus. Dr. Humphreys limed and fertilized the pastures and took blood samples again in 90 days. The man from Johns Hopkins drove to the farm to find out how he had brought up the calcium and phosphorus content of the blood in every case.

The previous year McLean won $43,000; *that* year $85,000; the *next* year $124,000. The doctor's contract was out, and in the next 2 years no more fertilizer was used and winnings dropped back to $45,000. That was on "good" bluegrass that people said needed no fertilizer! Results with dairy cattle work out about the same way.—*Arnold G. Ingham, Soil Conservation*

Plant Proteins Can Be Substituted for Animal Protein for Pigs on Pasture

Condensed from American Hampshire Herdsman

Condensed from Report by Damon Catron, University of Illinois

THE feeding of protein supplements is important in order to produce more pork, more efficiently and in shorter time. For every pound of protein supplement fed in dry lot, 6 pounds of corn are saved; and for every pound of protein fed on pasture, 4 pounds of corn are saved.

Since the supply of protein is somewhat spotted, it becomes necessary at times to interchange proteins. This leads the farmer to ask whether plant and animal proteins can be interchanged with equal efficiency.

Dr. Carroll, Dr. Fairbanks, and Dr. Krider in recent feeding trials at the University of Illinois have indicated the answers to these questions. They found that for weanling pigs up to 50 pounds in weight on rye pasture and for pigs 60 pounds up to market age, that soybean meal as the only protein feed gave approximately the same results as a protein mixture consisting of 2 parts tankage and one part soybean meal. More than 50 pigs were fed shelled corn and minerals in each lot in addition to the proteins.

When put in drylot after pasturing, hogs gained well on plant protein and there were no death losses. Pasture evidently stored something in the pigs that carried them successfully through the fattening period.

Plant proteins are unsuccessful for pigs that are on drylot continuously from birth, when a ration of corn middlings, soybean meal, minerals and cod liver oil are fed. A death loss of 75% was noted. This may be due to lack of certain essential vitamins rather than the quality of the protein.

This same ration was unsuccessful when 10% of alfalfa meal was added to the drylot ration. Alfalfa improved the ration, but the death loss was 34%.

When tankage, fishmeal and soybean meal were used as a protein supplement on drylot, the gains were poor and the death loss was 31%. However, when 10% alfalfa was added to the ration, the death loss was re-

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duced 18% and the gains were much more satisfactory with lighter feed consumption per pound of gain.

The mixed proteins have not proven superior in many feeding trials, especially in drylot. An example of this is the Trinity mixture (by percent — tankage 50, ground or chopped alfalfa 25, linseed meal 25.) However, Purdue University has had very good results with complex protein supplements.

Commercial supplements are still being built with 35% protein because of the necessity to conserve animal protein, even though more of tankage, meat scraps and fishmeal may be available in 1944 than in 1943. To get a better distribution of proteins, it has been necessary to lower the protein content from the standard 40 to 35%.

Purdue tests indicate that the change from 40 to 35% supplements is not a serious handicap to the hog feeder.

How to Conserve Proteins

1. Feed adequate amounts for lighter pigs up to 75 pounds and decrease percentage of protein as pigs approach market weight.
2. Feed balanced rations — Feed enough to balance the ration, thereby saving on grain.
3. Make maximum use of good pastures, thereby saving up to 50% on protein supplement.
4. Mix protein with ground grain when self fed. This will prevent pigs from over-eating on protein supplements that are too palatable. (Example soybean meal).
5. Use good quality ground legume hays (alfalfa, clover, or soybean) in rations when available. They will replace other proteins.
6. Keep self feeders properly adjusted so they do not waste feed.

Rental Charges for Machinery

Condensed from Pennsylvania Farmer

R. U. Blasingame

SINCE machinery is rationed, frequent questions are asked about what is a fair rental price to charge for its use. So many factors enter into the question that it is hard to get exact answers.

Reference can be made to data which have been developed by studies on farms relating to this question. For instance, R. H. Wilcox, of Illinois University, reports the following figures on the cost per hour of operating farm tractors, including oil and fuel but exclusive of the operator:

1. 50c for 9 to 16 drawbar horsepower.
2. 55c for 16 to 21 drawbar horsepower.
3. 70c for 21 to 30 drawbar horsepower.

The cost per acre for tractor mounted cultivators including fuel and oil exclusive of wages for the operator:

1. 2-row 9 to 16 horsepower 36c (20 acres in 10 hrs.).
2. 2-row 16 to 21 horsepower 32c (26 acres in 10 hrs.).
3. 4-row 21 to 30 horsepower 23c (50 acres in 10 hrs.).

The per-acre cost for tractor-drawn tools, not including power or wages of the operator:

1. 2 bottom tractor plow 21c.
2. 3 bottom tractor plow 24c.
3. 8-foot tandem disk 7c.
4. 10-foot tandem disk 6c.

For a two-row, horse-drawn corn planter 13c per acre; tractor 2-row planter 15c; 4-row planter, tractor type, 18c.

In case of an 8 or 10-foot grain drill, 15c; 11 or 12-foot, 20c. For a 5-foot mower horse-drawn, 22c; 7-foot cut tractor type mower 25c per acre.

The price of a side rake is 25c; a dump rake 20c.

Potato Machinery

Several years ago the Agricultural Engineering Department at The Pennsylvania State College Published Bulletin No. 306, "Potato Growing With Tractor Power," which included some data on the annual cost of machinery. These figures seem to run higher than the data from Illinois. This, no doubt, is due to the limestone land in Pennsylvania being more difficult to handle. The per-acre cost for a 2-row potato planter is $1.05; a 2-row tractor cultivator 18c; weeder 15c; sprayer (once over) 29c; digger $1.04.

Reprinted by permission from Pennsylvania Farmer, Pittsburgh, Penna., May 13, 1944

Calculate the Cost

The annual cost of owning farm machinery may be calculated by what is sometimes called the uniform depreciation method. In this there are certain elements of cost, such as:

1. Depreciation which is the first cost of the tool divided by the estimated life in years. About 15 years will cover most machines.

2. Interest is the average investment and can be calculated by adding the first cost and the value at the beginning of the last year's life and dividing by 2.

3. Housing, taxes and insurance are yearly charges of about 2% of the first cost.

4. Repairs will vary with the quality, care and type of machine. They will average from 5% for cultivators and tractors to 1% for corn and grain binders and hay loaders; 1½% for silage cutters and manure spreaders; 3 to 4% for mowers and plows.

The following example by an agricultural engineer will illustrate the application of these elements of cost to figuring the cost of owning machinery:

8 ft. grain binder costing $225, assumed to last 15 years, used 7 days per year, and repairs 2%.

Depreciation 225 ÷ 15	$15.00
Interest $\frac{225 + 15}{2} \times .06$	7.20
Housing, taxes, insurance, 2%	4.50
Repairs, 2%	4.50
Cost per year	$31.20
Cost per day	4.46
Cost per A. if 16 A. are cut per day	.28

It is one thing to figure the cost of owning a machine and operating on one's own farm; it is quite another when the machine is rented. The rental charge must be greater for the owner to come out even.

Magnesium for Apple Trees

Condensed from The Rural New-Yorker

Lawrence Southwick

MAGNESIUM is one of the mineral elements essential to normal plant nutrition. It is the key element in the molecule of chlorophyll which is the green pigment in plant tissues and which makes plant life possible. It also appears in many cases to function as a carrier of phosphorus in the plant, and may function in the process of cell division. Along with nitrogen, potassium, phosphorus, calcium, and sulfur, it is a major nutrient element and is required in considerable quantities by apple trees as well as other crop plants.

In magnesium deficient trees, low magnesium in the foliage is almost always accompanied by a relatively high level of potassium. This is important to remember in connection with the recommendations for treatment of magnesium deficiency in apple trees. Most of the data seem to indicate that 0.25 per cent dry matter of the leaf is near the critical level for magnesium in orchard trees. For interpreting the meaning of any figure for magnesium it is also important to know the potassium content. Thus, by chemical analyses of leaves, we can determine in many cases to what extent trees may be magnesium deficient. This method might be used more widely but for the fact that it is time consuming, and since it is usually done only by trained chemists, only a limited amount of such work can be attempted.

Since magnesium deficiency symptoms are rather easy to identify, this is the logical way to determine whether the trouble is present in our orchards. Of course, the symptoms must appear before the deficiency can be visibly identified. Until the latter part of July or some time in August, affected trees appear normal. Then, rather suddenly in most cases, leaf scorch appears, usually as irregular areas on the leaf blades. With some varieties, this browning is preceded or accompanied by yellow banding, mottling or chlorosis. The first leaves to scorch are the older ones near the base of the current year's shoot growths, and the scorch progresses upward as the season advances. Affected leaves often drop early, leaving bare stretches of wood. Sometimes, the leaves curl and remain attached, as with

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spur leaves. On bearing trees, the preharvest drop of fruit is increased markedly. In serious cases, growth of both tree and fruit is affected.

The question naturally arises as to why magnesium deficiency symptoms have become more prevalent and severe in the last few years. In Massachusetts, a number of orchards were affected in 1942 and during 1943 many growers reported deficiency symptoms. The deficiency has been more prevalent in some areas, but there are few apple sections in the state in which symptoms have not been noted at least in scattered orchards. In Maine, magnesium deficiency is quite general in several orchard sections and it has been observed in New Hampshire. It has been reported to be a factor in a few apple orchards in New York and it has been a serious malady in some Quebec orchards for several years. In short, the situation seems to be that magnesium deficiency is becoming more prevalent in Northeastern apple orchards and certainly in many cases, it is serious enough to require corrective measures.

Several factors may help to explain this increased prevalence of the deficiency in recent years aside from the probability that the trouble has been seen for many years without positive diagnosis. First, the increased usage of potassium in orchard fertilization may have caused a build-up which now accentuates the need for magnesium. There is ample evidence that potassium fertilization may increase or even foster magnesium deficiency of apple trees which are growing on soils with relatively low native magnesium supplies. We have seen this situation develop in Massachusetts. For instance, in one of our experimental orchards, the soil had been low in available potassium for some years and some signs of potash deficiency had appeared. Even though this soil was also relatively poorly supplied with magnesium, there had been no evidence from the appearance of the trees of a magnesium shortage. Following potash fertilization and a heavy mulching program (hay mulch supplies considerable available potassium as well as other nutrients), the potassium in the soil and in the trees is now high and a definite deficiency of magnesium has become evident. Also, heavy potash fertilization causes an increase in the intake of potash by trees, with a consequent tendency to lowered magnesium intake.

Furthermore, the trend toward increased use of mild sulfur sprays and of sulfur dusts has resulted in increased soil acidity since sulfur is a powerful acidifying agent. This factor of soil

acidity may not always be directly causal in relation to magnesium deficiency, but it is under the more acid soil conditions that the deficiency is usually prevalent. Some workers have found that highly acid soils not only hasten leaching out of magnesium, but make less available to the roots what remains in the soil.

What can be done to correct magnesium deficiency conditions in our orchards? In the Fall of 1942, various treatments were begun in our deficient experimental orchards at Amherst and in some commercial orchards. Soil treatments included 5-pound applications of magnesium sulfate, commonly called Epsom salts, and of Seawater Magnesia, and 10 to 50 pound applications of a high magnesium limestone. Rather unexpectedly, the first two treatments applied to young mulched trees showed beneficial results in 1943. In fact, good (though not complete) control of foliage scorch was secured. Kieserite was also used but instead of being applied on the surface, it was dug into the moist soil under the mulch and the trees treated in this way likewise were benefited. On the other hand, the limestone applications were not effective. Remembering that the trees in these tests were young and mulched heavily, the results of similar treatments in a mature sod orchard are particularly interesting. Both 5 and 10 pounds of Epsom salts and of Kieserite and 10 and 50 pounds of magnesium limestone per tree were applied in early September, 1942, to trees showing moderate to severe deficiency scorch symptoms. One year later (1943), in striking contrast to the results reported above with young trees, all of the trees, regardless of treatment, were scorched just as severely as the year previous. Also, magnesium in the leaves was no higher in 1943 than in 1942. In some cases it was lower.

So here we have seemingly conflicting results. Whereas, the young mulched trees were able to benefit from the applied magnesium, the older trees in sod evidently were unable to take it up in sufficient quantities either to cause a build-up in leaf tissue or to reduce the deficiency symptoms. Actually, the lack of response by these trees is not as surprising as the positive response of the younger trees. In England and Canada, where magnesium deficiency has been known for a longer time than in this country, much difficulty has been encountered in correcting it. It has often required more than three years of soil application to bring about appreciable benefits. The failure to obtain control sooner is not easy to explain, but it is a situation that confronts growers. It is to be noted that no magnesium

limestone applications were beneficial in the time interval of one year. This is to be expected since the magnesium in limestone is not as soluble as that in Epsom salts. However, Dr. E. B. Kidson of the Cawthron Institute in New Zealand, who has devoted much study to the magnesium deficiency problem in apple orchards, found that dolomite (magnesium limestone) has proved as effective in the long run as Epsom salts. His work shows that with some materials, it takes at least 2 to 4 weeks to bring about appreciable improvement in bearing apple trees.

The use of special magnesium sprays has been tried and on the basis of results to date, this method seems promising. An extensive trial was conducted in one of our orchards at Amherst last year. More than 400 young trees were included in this test. One-third of the trees received 4 applications of spray containing 16 pounds of Epsom salts in 100 gallons of water. These special applications were made on May 13, May 25, June 4 and June 16, corresponding approximately with the dates for the pink, calyx, first cover, and second cover sprays. Another third of the trees received only the two earlier magnesium spray applications and the remainder were checks. All of the trees were inspected in September for leaf scorch. The data showed conclusively that the 4-way program was decidedly beneficial. Sixty-five percent of these trees were entirely free from scorch compared with only 27 percent of those receiving 2 sprays and 19 percent of the check trees.

Sudan for Summer Succulence

Condensed from The Ohio Farmer

C. J. Willard

EACH year since 1939, a field of sudan grass has helped to furnish abundant **green** succulent feed for the Ohio State University's dairy cattle during the inevitable July and August slump of bluegrass pastures.

Sudan is one of the best sources of summer pasture. Another reliable summer pasture is the second crop or aftermath from the hay fields, especially alfalfa, alfalfa mixtures, and clover mixtures.

However, this year *every possible acre of clover or alfalfa should be left for seed.* These seeds were in short supply and high priced this spring, but next year they will be much scarcer. Carryovers are almost gone, the possible seed acreage is low, and if all possible seed is not harvested this summer, a real disaster is on the way. Legume seeds are the foundation of our hay production, of our rotation systems, and so of our entire crop production. Of all agricultural war shortages that of clover and other legume seeds is most threatening and most serious.

So, this year, despite multiplied demands for our acres, let's set aside an area for sudan grass, so that we can leave that second growth clover for seed instead of pasturing it. One acre for each two or three cows is a good rule.

Twenty to 25 pounds per acre is the standard rate, but by using special care in seeding this might be cut to 15 pounds.

Plow the field some time in advance of sowing sudan, so that the soil becomes well settled and some crops of weeds are killed before seeding. Do not sow sudan until the soil is warm. It can be sown any time in June or even in early July, but with steadily decreasing yields after June 10.

Sow the seed *shallow*—about ½ inch deep. The drill will sow sudan too deep unless the seedbed is firm. Broadcasting on a cultipacked surface and covering with a harrow or by cultipacking again is an excellent method. Fertilizer applied directly for sudan grass is not likely to be profitable on productive soils. On unproductive soils 150-200 pounds per acre of 4-10-6 may be desirable. The crop following sudan will require good fertilization, especially manure or some other nitrogen carrier.

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Grazing may start when the plants are 12 to 18 inches high. This is four to six weeks after sowing. Alternate grazing of two areas is a good plan. It may be desirable to remove the cattle for a day or two after heavy rains.

Much has been said about poisoning from sudan grass, but we have not heard of a case of such poisoning in Ohio. The danger is greatest from young dark-green grass under 12 inches high. If pastured as suggested above, the hazard is negligible. *Frosting does not make sudan more poisonous.* New growth, two or three weeks after an early frost, might be.

Because sudan seed is scarce this year, the question of substitutes is important, but no crop is as good as sudan for pasture. Japanese or barnyard millet does well in most soils and cool weather, but is almost a total loss in dry hot situations, which are the more common in Ohio soils and summers. The sweet sorghums or "cane" at 30 to 45 pounds per acre will make as much growth as sudan, but are more hazardous to pasture. Field corn sowed at two bushels per acre will make as much growth as sudan. It will not recover as well, if at all, after pasturing, but might be a worth-while crop to save clover seed fields from pasturing. German or golden millet is the best of the foxtail millets, but does not recover after pasturing as sudan does.

Nitrogen Fertilization of Haylands

Condensed from New England Homestead

W. G. Colby

HAY yields are usually largest for the first two years after seeding. After that yields from unfertilized hay fields fall off rapidly for a year or two, then more gradually for several years until the sod is "run-out" and reseeding becomes necessary. In the beginning the clovers form a substantial part of the vegetation and supply the necessary nitrogen. Following the normal disappearance of the common clovers after two years, lack of nitrogen usually restricts the growth of the persisting perennial grasses, and is an important cause of decrease in production.

A marked increase in hay fields from the addition of nitrogen on grass mowings has been demonstrated many times. More than 40 years ago the Connecticut Experiment Station demonstrated yield increases from nitrogen addition, in reporting that a plot receiving 310 lbs. of nitrate of soda in the spring yielded 5200 lbs. of hay per acre compared with an 1821 lb. hay yield from the check plot.

In a series of experiments recently carried out by the Massachusetts Experiment Station different kinds of nitrogen fertilizers were used and applications were made at different times during the year—early spring, mid-summer, early fall, and late fall. Each plot received but one application a year. In each case, the rate of application was 60 lbs. of elemental nitrogen to the acre. This amount of nitrogen would be supplied by approximately 375 lbs. of sodium nitrate, or 290 lbs. of ammonium sulphate, or 285 lbs. of calcium cyanamid, or 185 lbs. of ammonium nitrate. The plots were laid out on three-year-old mowings and were continued for four years.

In one treatment, sodium nitrate, applied in the spring at the rate of 375 lbs. to the acre, resulted in an average annual first cutting hay yield of 4970 lbs. per acre compared with a 3690 lb. yield from the check plot. It should be noted here that all plots received liberal applications of phosphoric acid and potash annually. The large differences in the check plot yields between

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the Connecticut and Massachusetts experiments may be explained by the facts that (1) in the case of the latter the whole field had been well fertilized previous to the laying out of the experiment, and (2) in the Connecticut experiment the check plots did not receive fertilizer of any kind.

The response which can be expected from similar applications of nitrogen on most hayland in Massachusetts would probably lie somewhere between the results of the two experiments. Following spring application of 50-60 lbs. of elemental nitrogen per acre, a reasonable expectation of yield would be an increase of three quarters of a ton to one ton of hay to the acre from the first cutting.

Summer top-dressing of haylands following removal of the first hay crop has been advocated for many years, but unfortunately this practice has never been widely adopted. Actually, in our experiments, mid-summer applications were more effective than spring top-dressings because the total yield of protein was higher. An application of 375 lbs. of sodium nitrate after the first crop of hay had been removed produced just as much total dry matter and 15% more crude protein over the whole season (two cuttings) than did the same amount of fertilizer applied in the spring.

The rowen or second hay crop is always higher in protein than the first crop, provided the first crop is not cut early—i.e., earlier than customary. The addition of nitrogen fertilizer to the rowen crop did not increase protein content but it did influence the yield of the second cutting and, therefore, because of increased rowen yield, there was a greater total yield of crude protein. The average protein content for the first cutting (all first cuttings were made at full-bloom stage) was 7.2% and for the second or rowen cutting, 12.8%. This year when supplies of protein concentrates are limited, increasing the yield of the rowen crop is an important consideration.

To get the best results from a top-dressed rowen crop it is essential that the first cutting be made early—not later than the full-bloom stage. The rowen crop must have adequate time to develop. Also, in selecting a field for mid-summer fertilization, one which had not been topdressed in the spring would be preferable to one which had.

In all of our experiments we found that the use of nitrogen increased the yield of dry matter, but had little effect on the protein content. The crude protein content of hay from the checks and the treated plots for both the first

and second cutting was essentially the same. The time of cutting is the important factor. Early cut hay is always higher in protein than late cut hay and so is of greater feeding value.

Ammonium nitrate in the form in which it is now being offered for sale is a relatively new nitrogen fertilizer. Although too new to have undergone extensive testing, preliminary trials have indicated that this source of nitrogen is just as effective on haylands as any other nitrogen fertilizer.

Sodium nitrate, ammonium sulphate, calcium cyanamid, and urea have all been used in nitrogen topdressing experiments. Thus far we have not been able to demonstrate experimentally any marked superiority of one form of nitrogen over another, for top-dressing haylands. However, this is true only when the soil has been adequately supplied with minerals, including lime, and when applications are made at suitable times.

Nitrogen fertilizers do vary in both their chemical and their physical characteristics. They differ in influence on soil reaction, in their tendency to leach, and in the time required after application to produce a response. Ammonium nitrate compares favorably, in most respects, with other forms of nitrogen. It has a slight tendency to produce an acid reaction in the soil but this is not of great consequence on good grass sods which receive lime occasionally. Because of its extreme solubility, it is one of the quickest-acting nitrogen fertilizers known.

The physical condition of the material as it is now being supplied is excellent. Any fertilizer spreading equipment that can be adjusted to deliver 150 to 175 lbs. of material per acre will handle it satisfactorily. Since experience in handling this material is still limited it would not be wise to store it for more than a few weeks before using, particularly during the summer. From the standpoint of cost, a unit of nitrogen from ammonium nitrate will probably be as cheap if not cheaper than from any other nitrogen source available at the present time.

Nitrogen increases hay yields, but minerals are necessary to produce a healthy, vigorous growth of grass and to insure good feeding quality of the cured hay. Plants, like animals, thrive best on a balanced diet. Balancing the diet of the plant is undoubtedly one of the most satisfactory ways of balancing the diet of the animal that consumes it. In the past, some of us have been too much concerned with increasing the yield of roughage and have overlooked the significance of high feeding quality.

Most hay fields need potash, and also phosphoric acid, by the

time the clovers are gone. Many farmers who regularly top-dress their grass mowings with manure or a complete fertilizer, such as a 7-7-7 or a 10-10-10 recognize this fact. But this year, because of limited supplies of potash, the quantity of complete fertilizer for top-dressing use is small and few farmers have manure enough for a heavy dressing of all their hayland. Nitrogen fertilizers in the form of ammonium nitrate and sodium nitrate are available and should be used, but their use without mineral supplements should be looked upon only as a wartime measure to produce needed feed, and not as a permanent practice.

Reseeding hay fields periodically is essential if satisfactory yields of quality hay are to be maintained. If fields are not top-dressed at all, yields fall off sharply as soon as the common clovers disappear which is usually after the second year. Top-dressing maintains high yields for several years longer. But in spite of top-dressings, the composition of the vegetative cover gradually changes; and less valuable hay grasses come to make up a large percentage of the sod population. When this occurs, it is time to plow and reseed.

Nebraska's War on Weeds

Condensed from Farm Journal and Farmer's Wife

Robert R. Johnson

LONG ago prairie fires taught pioneer farmers of Nebraska the value of co-operation. One man alone could accomplish little; neighbors banded together were equal to the task.

Such community teamwork today is responsible for the success of Nebraska's 47 weed control districts, which show definite advances in the fight against noxious weeds on more than 6,000,000 acres of farmland.

Before 1937, weed control efforts were hit-or-miss. A single farm whose operator was indifferent could keep the vicinity weed-infested, despite his neighbors' best efforts.

That year the picture changed abruptly when the state legislature set up the machinery for noxious weed districts, and provided for eradication of noxious weeds from all roads, railroad right-of-ways, irrigation ditches and canals, as well as farms.

Bindweed alone costs Nebraska farmers $2,000,000 in crop losses annually, according to Dr. F. D. Kiem, chairman of the agronomy department, University of Nebraska, and member of the state weed advisory committee. Other noxious weeds designated by the state weed law are puncture vine, leafy spurge, Canada thistle, perennial peppergrass, and Russian knapweed.

While the law has teeth (violators may be fined up to $500), voluntary co-operation is stressed. All land-owners in the district share in organization and administration expenses, but each is responsible for the eradication of weeds on his own land.

Districts are organized upon petition by 51% of resident land-owners, or owners of 60% of any adjoining lands. Upon receiving the petition, the county clerk notifies the director of the State Department of Agriculture and Inspection. The director has a survey and map made of the proposed district, showing infested lands, and recommends whether or not a district shall be formed.

Final decision rests with the county board at a public hearing, of which land-owners and persons having any interests in such land are given notice. If the petition is approved, after presentation of evidence and objec-

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tions, the county clerk calls a meeting for the election of supervisors, in whom authority and control rests. These three or five men serve without pay, except for actual traveling expenses. Meetings are held with members to discuss the work. Supervisors may hire help and buy machinery.

A weed district may be as small as one square mile. The present districts range in size from 9,600 to 365,000 acres. Thirteen counties are organized on a county-wide basis. The 47 districts represent only about half the counties in the state, but are in the areas of heaviest infestation.

The system has these advantages:

1. Assures district-wide eradication and control program.

2. Clears all roads, railroad right-of-ways, ditches, canals and other non-agricultural lands of noxious weeds.

3. Insures protection to lands not infested.

4. Secures state assistance in surveys, maps, and recommendations for eradication.

The expenses of organization and administration have varied the first year from one-half *cent* to a cent and a half per acre, for all land included in the districts. After the first year expenses have been even less.

If a land-owner refuses to control his weeds, the work may be done by the district, the cost certified to the county clerk, and collected like other taxes. Non-co-operators are also liable to cash fines.

Mitchell precinct in Scotts Bluff county was organized in 1938—the first weed district in the state. Eighty-eight farms had 73 acres of noxious weeds. Weeds on all but one of the 73 infested acres are now under control, or have been eradicated.

Cuming county, the first county-wide district in the state, was organized in 1940. Secretary Arvid Johnson reports 98% of the farmers are co-operating, and have 1,000 of the original 1,280 infested acres under eradication. He estimates 300 acres of bindweed have been eradicated.

The Wayne county district has used 305,000 pounds of sodium chlorate and 225 tons of salt. One hundred farmers in Cedar county have completed eradication on farms, and have treated all infested roadsides.

"Pasting Up" and Brooding Temperature

Condensed from American Agriculturist

L. E. Weaver

ABOUT two years ago it was reported that there are fewer "pasted up" chicks when they are started on fine chick grain than when a starting mash is fed from the beginning. A chick is "pasted up" when the discharge from the bowel is soft and sticky so that it clings to the down and becomes an encrusted accumulation. Many poultrymen have adopted the practice of starting their chicks on grain. There is some difference of opinion as to whether grain should be fed for two or for three days, but everybody seems to agree that starting with grain does cut down the number of cases of pasting up.

Just how serious is "pasting up" anyway? And what causes it? These questions were still unanswered. So last year the research men of Kasco Mills ran some tests and got the answers. They ran three experiments.

In each experiment chicks were brooded at 98° F., which was considered the proper temperature for chicks on a wire floor. Other lots were brooded at temperatures known to be too high or too low. One lot was brooded at 84° F. In all cases duplicate lots were started on all-mash and on fine chick grain respectively. Here are some of the facts that the experiments revealed.

1. When the temperature was right (98° F.) there was practically no pasting up regardless of mash or grain.

2. When the temperature was too high or too low pasting up occurred, but there were fewer cases when chicks were started on grain than when they were started on all mash.

3. Pasting up did not increase the number of deaths except in the groups brooded at the extremely low temperature of 84° F.

4. At the end of three weeks there was practically no difference between the grain-started group and the mash-started group in amount of pasting up, amount of feed consumed, or gains made.

5. Two days of grain feeding was as effective as three days in reducing pasting up when the temperature was not correct.

All of which seems to indicate that the kind of feed the chicks get at the start is less important than a proper brooding temperature.

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Feeding, Breeding and Management Studies

Condensed from Holstein-Friesian World

From the Annual Report of

O. E. Reed

Chief, Bureau of Dairy Industry

FOR years dairymen and dairy workers have insisted that grain rations for dairy cows should contain a number of different grains or grain by-products, including high-protein concentrates. These ideas are based on beliefs that such a mixture is likely to be more palatable than a single grain and that no essential nutrient (especially amino acids in the protein) is so likely to be lacking.

Experiments recently completed at three of the Bureau's field stations (Woodward, Okla., Hannibal, Mo., and Mandan, N. Dak.,) show that dairy cows will produce well and economically on a single-grain ration, such as corn, barley, or kafir, if they receive all of the legume hay and silage they want. The results indicate that complicated grain mixtures, often containing six or eight different grains or grain by-products, are not necessary for good production. This information is of considerable practical importance at present, because of the shortage of many of the feeds ordinarily used in mixtures, especially high-protein concentrates.

In these experiments four cows at each station were fed a single grain (barley at one station, corn at another, and kafir at another) in comparison with four cows at each station that were fed a grain mixture composed of four or five grains and by-products, including high-protein concentrates. The cows were also fed all the alfalfa hay and silage they would eat, but they had no pasture. They were on the experimental rations throughout one lactation period, averaging 358 days in lactation. Both the single grain and the mixtures were fed at a limited rate, averaging 1 pound for each 5.75 pounds of milk produced.

The 12 cows on the single grain averaged 12,347 pounds of milk and 505 pounds of butterfat and the 12 cows on the grain mixture averaged 13,251 pounds of milk and 531 pounds of butterfat (ma-

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ture basis). The single-grain group produced 93 percent as much milk and 95 percent as much butterfat as the mixed-grain group. Both groups gained in body weight during the experiment, the single-grain group averaging 130 pounds per cow and the mixed-grain group 105 pounds. The single-grain ration contained approximately 11 percent crude protein and the grain mixture contained approximately 18 percent. Both groups of *cows* consumed considerably more protein and total digestible nutrients than they required for maintenance and production. In fact the alfalfa hay they consumed furnished more than enough digestible crude protein to meet their requirements. There were no indications of any nutritional deficiencies in either ration. At current local prices for feeds, the feed cost per pound of butterfat was 28 cents for the single-grain ration and 31 cents for the grain mixture at one station; 25 and 23 cents, respectively, at another station; and 27 cents for each ration at the third station.

Sulfa Drugs May 'Cure' Mastitis

Mastitis is a widespread disease of dairy cattle, which usually causes a severe reduction in milk production or makes the milk unfit for use. Conservative estimates by the Bureau of Dairy Industry, based on various surveys of the prevalence of the disease and its effects, indicate that dairymen in 1942 lost at least 3 percent of their potential milk production as a result of mastitis, or 3½ billion pounds, which was approximately the additional quantity needed to meet the national milk-production goal.

Many attempts have been made to control mastitis, with varying degrees of success, but little if any improvement has been made in eliminating the disease from the dairy industry as a whole. Recently, however, investigators elsewhere announced some success in eliminating streptococcic infections from dairy cow udders by using injections of sulfanilamide in oil. This work prompted the Bureau to try the treatment, with certain modifications, in the dairy herd at Beltsville, to determine its effectiveness in eliminating the various types of organisms associated with the disease.

Milk from 170 cows in the Beltsville herd was examined bacteriologically and 56, or 32.9 percents, of the cows were found to be harboring various organisms capable of causing mastitis. Treatment of the 56 cows consisted of infusing the infected quarters of the udders with a mineral oil suspension of sulfanilamide and sulfadiazine, the amount of the suspension varying from case to case. Following treatment, milk samples were

again taken from each quarter for bacteriological examination; and at least two such samples had to be negative for mastitis organisms before the quarter was considered "cured." Results for 7 cows are still incomplete; but of the other 49 cows, 39, or nearly 80 percent, apparently have been cleared of infection.

Most of the treatments heretofore recommended for eliminating mastitis organisms have been effective against only one, *Streptococcus agalactiae.* Of the 108 treated quarters, 80 were infected with streptococci and 87.5 percent were cleared; 8 had staphylococci and 87.5 percent were cleared; 2 had a combination of streptococci and staphylococci, and 100 percent were cleared; 12 had *Pseudomonas aeruginosa* and 83.3 percent were cleared; and 6 had coliform infections and 83.3 percent were cleared. It is apparent that these different types of infection have responded to treatment at very nearly the same rate.

The treatments have been administered without causing an appreciable physiological reaction or change in the udder, or any significant reduction in milk production either during treatment or immediately thereafter. The study will be continued with the use of still other drugs and combinations to determine whether mastitis infections can be entirely eliminated from a herd and whether the herd once free of infection can be kept free.

Breeding Investigations

Inbreeding Should Be Practiced Only By Skilled Breeders

An inbreeding experiment with grade Holstein cattle, which was begun 30 years ago at Beltsville, Md., was terminated this year when it appeared that no further worth-while information would be obtained by attempting to intensify the inbreeding still more. No other studies have ever been reported in which cattle were inbred to the same degree as some of the animals in this experiment. The results indicate that inbreeding should be practiced with considerable discretion and only by skilled breeders. Properly employed, inbreeding is a useful method of concentrating and perpetuating the germ plasm of a superior sire or dam to improve a herd of dairy cattle.

The first objective of this experiment was to determine whether a poor herd of mixed breeding could be developed into a good producing herd through the use of only one good bull. The superior Holstein bull used in the first phase of the experiment sired daughters that were a big improvement over the foundation herd, in which Jersey and Guernsey breeding predominated; and when he was mated to

his first-generation daughters, the second-generation daughters were better than their dams but the degree of improvement was considerably less than that made by the first generation. The two generations of improved animals were evidence that a good herd of producers could be developed from a poor herd through the use of a superior bull.

Since these daughter-sire matings showed no harmful results, it was decided to continue the investigation to determine the effects of more intensive inbreeding. Accordingly, a highly inbred son of the first sire was selected to head the herd, and he in turn was followed by one of his inbred sons, and so on until eight such sires had been used.

As the intensity of inbreeding increased there was a constant and unmistakable decrease in the weight of the calves at birth, the mortality was greater, the rate of growth was slower, the size was less at maturity, vigor was impaired, and production declined. Fertility, as measured by the number of services required for conception, was also affected adversely but not to a serious extent.

When the inbred cows were mated with unrelated, registered Holstein bulls, the offspring approached normality in every respect, which indicated that the bad effects of the inbreeding were almost completely overcome by a single outcross.

Proved-Sire System of Breeding Improves Dairy Production

In an effort to develop strains of cattle "pure" in their inheritance for a high level of milk and butterfat production, the Bureau of Dairy Industry has been using the proved-sire system of breeding in its experimental herds at Beltsville ever since the herds were established 25 years ago. This system of breeding calls for the continuous use of proved sires, i. e., progeny-tested sires of outstanding merit.

The success of the proved-sire system is indicated by the steadily rising production averages in the Beltsville herds, where feeding and environmental conditions have remained uniform from the start and no selective culling has been practiced.

The 34 foundation cows in the Holstein herd averaged 678 pounds of butterfat per cow. The 54 cows that made up the milking herd on July 1, 1943, averaged 817 pounds of butterfat per cow (all records on a mature-equivalent basis). The herd averages on the same date the 5 preceding years were 801, 801, 777, 757, and 721 pounds.

The 36 foundation cows in the Jersey herd averaged 622 pounds of butterfat per cow. The 38 cows making up the milking herd on July 1, 1943, averaged 757

pounds of butterfat per cow (mature-equivalent basis). The herd averages on the same date the 5 preceding years were 780, 753, 717, 710 and 698 pounds.

New Method of Making Grass Silage Introduced

Because of the shortage of molasses and the high cost of acids ordinarily used in "preserving" grass and legume silage, the Bureau has been able during the last few years to induce many farmers to try the so-called "wilting" method, which requires no preservative. Thousands of farmers having tried the new method through necessity are now continuing to use it through choice.

Farmers had been slow to adopt the wilting method because of a deep-seated conviction that the use of molasses or acids or some other preservative was necessary for good results. Another obstacle, perhaps, was the fact that they had no practical means of determining just when the crop had wilted to the right moisture content to make good silage. Early last year, however, the Bureau devised a simple inexpensive moisture tester that can be made from materials usually at hand on the farm.

The Bureau's silage-making investigations proved that, with proper attention to the moisture content of the crop and complete exclusion of the air from the silo, no acid development or fermentation is needed with any crop. Small grains and the true grasses can be made into good silage without the farmer's having to exercise any particular precaution. Legume crops, however, must be allowed to wilt in the swath a few hours or until the moisture content is reduced to within the desired limits.

If the tester shows too much moisture, the crop may be wilted further or some dry material, such as dry hay or ground corn and cob meal, may be added to soak up the excess moisture in the silo. County agents and other extension workers have demonstrated the tester to thousands of farmers, to acquaint them with the appearance of the chopped crop at the time the moisture content is suitable. With a little practice farmers are learning to judge when a crop is right for the silo just as they have learned how to tell when hay is dry enough for the mow or stack.

Summer Ventilation for Poultry Houses

Condensed from Electricity on the Farm

Bruce Fearn

Philadelphia Electric Co., Coatsville, Pa.

MR. E. S. CHANDLER of near Bristol, Bucks County, is a Pennsylvania dirt farmer. In recent years he has concentrated on poultry and apples.

Ed Chandler does an amazing amount of work with electricity. As an illustration he prepares and mixes his chicken feed with electricity, irrigates his orchard and grinds grain with a portable 5 HP motor, cools his apple storage with a 24" ventilating fan, broods his chicks with electric brooders, and lights and ventilates his chicken pens with electricity.

Of all these applications the most outstanding one is the ventilation of the chicken pens. In fact this job of ventilation would be outstanding anywhere. It is especially so when it is remembered that the job is used in a remodeled barn. It proves one thing particularly — that good fundamentals of ventilation will work anywhere.

The remodeled barn houses 2,000 hens. During the hot sultry summer days the accumulated heat load in the building would become pretty large. The result was the loss of mature producing stock through heat prostration and in addition the egg production of the whole flock was lowered. This loss of hens on one occasion amounted to 72 hens in one day. That is out of the ordinary to be sure but it is a fact nevertheless. The situation got so critical that something had to be done and Ed. Chandler got in touch with the electric company's rural representative. A survey of the job showed that heat was a problem only when the air became still and the heat was allowed to accumulate in the building. Therefore it was decided to move the air electrically with enough velocity to dissipate the heat as fast as it was created. To do this a 30-in. low speed belt driven exhaust fan was installed in one pen for trial. The results were immediate and so satisfactory that Mr. Chandler installed two more 30-in. fans and three 24-in. fans of the same type to provide the other pens with as much air motion.

In two years operation of this

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installation there have never been more than 2 or 3 hens lost in any day due to heat prostration, and egg production has been maintained all during the hot weather. Mr. Chandler says it is often more comfortable in his chicken pens than it is outside and the investment in fans and electricity is covered with a profit to spare on the increased egg production alone.

Bomb Kills Insects

One of the developments of this war growing out of experimental work of the U. S. Department of Agriculture—the insecticidal aerosol—provides a new method of using old weapons in man's ceaseless battle against insects. "Aerosol" is the scientific term for smoke or fog. As is implied, the insecticide or killing material is carried in suspension in the air as a smoke or fog.

The principle of the aerosol or liquefied-gas of combatting insects is very simple. The insecticide is dissolved in a low-boiling liquid, which exerts considerable pressure in the closed can containing it. The solution is then released through a small opening, the sudden change in pressure allowing it to boil violently and disperse the insecticide into the air.

In this "fog" the killing material stays active much longer than a spray, which settles completely in about two minutes. Efficiency of the spray is thus greatly increased.

The aerosol can be used in barracks, tents, and fox holes. One pound of aerosol is more effective than two gallons of the old-type fly spray and therefore the shipping space for insecticide is greatly reduced. The new material is already in common use in fumigating airplanes to prevent the spread of disease-carrying insects. One large-scale experiment showed that mosquitoes and flies could be cleaned out of a factory containing 27 million cubic feet of space without interrupting the regular work.

As now used the aerosol is put up in small cylinders, called bombs. These are, however, not now available for civilian uses. After the war it is possible that bombs of this type may come into general use around the home and farm. The day may come when we buy fly spray by the bomb instead of by the gallon.

—Dakota Farmer

Finer, Better Lime

Condensed from Farm Science Reporter

B. J. Firkins and W. H. Pierre

DURING the past 4 years, Iowa farmers have used over 5 million tons of ground limestone.

Now more than ever before, we need to get the quickest results and the greatest efficiency possible from the limestone we use. This means, first of all, using limestone that is finely ground—limestone that contains a large percentage of "dust." Unfortunately, much of our ground limestone is too coarse for maximum war-time value, as our study here shows.

Many ground limestones contain particles that vary from dust in size to particles that are the size of gravel. When limestone is applied to the soil, the fine particles dissolve readily and combine with the soil acids to neutralize them and to furnish calcium to the plants. The coarse particles, however, dissolve very slowly and many of them will not be of any value in the soil for a number of years after application.

It is very important, therefore, to determine the fineness of any ground limestone if we are to know its value. Fortunately, this is easily done by passing a small sample of the ground limestone over a set of small screens or sieves. Usually three different sized sieves are used in our screen analysis. The coarsest of these sieves has eight openings per linear inch and is known as an 8-mesh sieve; the finest sieve has 60 openings per inch, and is referred to as a 60-mesh sieve.

By knowing what percentage of a sample of limestone is made up of particles of these different sizes the value of the limestone during the first few years after it is applied to the soil can be easily calculated.

Particles held on an 8-mesh sieve have relatively little value in correcting soil acidity during the first few years after application, whereas the particles that pass a 60-mesh sieve are practically all available during the first few months after application. It is for this reason that the fineness specification usually recommended, requires that at least 90 percent of the limestone particles should pass through an 8-mesh sieve.

The benefits that are obtained by using limestone that is finely

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ground are well illustrated in some results we obtained with alfalfa on Tama silt loam soil. Three different grades of limestone were compared. The limestone in all cases was thoroughly disked into the soil in early spring before seeding the oats and alfalfa.

When the alfalfa hay was harvested the following year, it was found that the 40-60 mesh limestone, the finest grade used in this experiment, had increased the yield of alfalfa by an average of 1.69 tons per acre; whereas the coarsest grade, the 10-20 mesh limestone, had increased the yield only 0.58 tons per acre.

The 10-20 mesh limestone was only 33 percent as effective as the 40-60 mesh material. With time, of course, the coarser particles gradually become more available. Even after 7 years, however, the 10-20 mesh limestone was only 64 percent as effective as the finer grade.

On the basis of such data as reported here for alfalfa, we have prepared a score card or rating for calculating the value of any ground limestone on the basis of its screen analysis. By the use of this score card it is possible to determine about what percentage of any limestone will be available in the soil in the first year or two after application, and thus to compare ground limestones from different sources.

The portion of the ground limestone which passes through a 60-mesh sieve is considered to be 100 percent available. This material is often referred to as "dust." The portion of the limestone that is held on the 8-mesh sieve, however, has a rating of only 10 percent availability during the first 1 to 3 years after application.

Other states such as Illinois, North Carolina, Ohio, Pennsylvania and West Virginia have also established ratings for evaluating limestones of different degrees of fineness. In general, there is good agreement among the various ratings. The Illinois rating shows higher values for coarse limestone, but it is based on a 5-year rather than on a 1 to 3-year period. The Ohio rating which is based on considerable experimental work gives slightly lower credit to coarse limestone than does the Iowa rating but it is in general in good agreement with it.

During the past season, 182 samples of limestone were obtained from different parts of the state in order to determine the quality of limestone now being sold to Iowa farmers. A weighed sample from each ground limestone was poured over the different size sieves in order to find out the proportion of coarse and fine particles. Tests were also made

of the purity or neutralizing value of each limestone.

The results obtained show that the ground limestones now used in the state vary greatly in agricultural value, and that many of them are of relatively poor quality. As an average for all samples, 18 percent of each sample was too coarse to pass an 8-mesh sieve and only 31.2 percent was sufficiently fine to pass the 60-mesh sieve. Moreover, only 38 percent of all samples met the commonly accepted standard that at least 90 percent of any ground limestone should be fine enough to pass an 8-mesh sieve.

The 25 coarsest samples showed an average of 33 percent of material too coarse to pass an 8-mesh sieve and only 17.4 percent fine enough to pass through a 60-mesh sieve. This is in striking contrast to the values obtained for the 25 limestones that had been most finely ground. The finer limestones contained nearly three times as much fine material (passing through 60-mesh sieve) and only one-fifth as high a proportion of coarse particles as did the 25 coarsest samples.

If we compare the value of the coarsest and finest samples on the basis of the relative efficiency of the different particle sizes, we find that where it would take 2 tons of the most finely ground limestones to grow a good crop of alfalfa on a given soil during the first year or two after liming, it would take 3½ tons of the coarsely ground limestone to give the same results.

The purity or neutralizing value of limestones is also an important factor in determining their agricultural value. The neutralizing value of limestones is usually expressed as "percent calcium carbonate equivalent," or "% C. C. E." Pure calcium limestone gives a C. C. E. value of 100 percent.

In our study of the 182 limestones obtained from different parts of the state, we found that they averaged 83.0 percent C. C. E. The 25 poorest samples, however, averaged only 64.3 percent whereas the 25 best samples averaged 96.3 percent equivalent. Because of this difference in neutralizing value it would take exactly 3 tons of the poorest to be equal to 2 tons of the best.

The marked demand for and the rapid increase in the use of limestone during the past few years probably accounts for the tendency toward a lowering of standards. This is unfortunate at the present time. We need to increase the amount of limestone used on farms, but we also need to get the greatest returns possible in terms of bushels of corn and tons of alfalfa from every ton of limestone used.

The bottlenecks in production are largely due to shortages of

labor and transportation. It takes the same amount of labor and transportation facilities to produce and haul limestone that is of low quality, or is so coarsely ground that much of it will not become available in the soil during the next few years, as it does to produce, haul and spread limestone that is of high quality and quickly available in the soil. Moreover, the particles of limestone that are so coarse that they remain in the soil practically unchanged for several years are making little contribution to food production and the war effort.

Our slogan for the present war production program should be "Use more limestone of better quality to maximize food production."

Controlling Corn Earworm

Condensed from Farm Research

Laurence A. Carruth

Geneva

THE practical importance of insect injury to market sweet corn is indicated by an order of the New York State Department of Agriculture and Markets which permits only sweet corn offered as U. S. Fancy or U. S. No. 1 to be sold in the markets of the State. In effect this excludes, save for a 10 per cent tolerance, all sweet corn having insect damage located more than 1½ inches from the tip of the ear. The two principal insect pests concerned with such damage are the European corn borer and the corn earworm.

The injury of the earworm is confined to the ears. No stalk injury is produced as in the case of the borer. In general, the injury is most important from mid-August to the end of the growing season, altho serious damage in July, caused by an early generation, has been observed.

Of the various methods thus far tested for the control of the corn earworm, the mineral oil treatment has been the most effective and practical. Further experimental work is needed to perfect certain details, altho essential principles have become so well established that this form of control now deserves a wider usage by growers in sections where the corn earworm is a practical problem. The mineral oil treatment will not control the

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European corn borer nor will the insecticide treatments effective against the borer offer much control of the earworm.

The mineral oil method of earworm control involves the individual treatment of each ear. A small quantity of heavy, highly refined mineral oil to which an insecticide has been added is injected into the "silk channel," between the cob and the exterior, after the completion of pollination but before the young worms have begun feeding on the kernels. The cost is low, the principal item being labor. The oil-insecticide mixtures are harmless to the operator and the consumer and, when properly applied, leave no perceptible color or appreciable odor at harvest.

A heavy, white mineral oil of U. S. P. grade, having a viscosity between 175 and 210 seconds (Saybolt 100° F.) should be used. Altho some control can be obtained by the use of oil alone, the effectiveness of the treatment is increased by the addition of an insecticide. Pyrethrum and dichlorethyl ether have proved suitable for this purpose. Good control can be obtained with oil-insecticide mixtures containing either 0.1 per cent pyrethrins or 1 per cent dichlorethyl ether. Commercial preparations, usually containing double these quantities of insecticide, are now available.

The successful use of this treatment demands careful attention to the dosage per ear and the proper timing of treatments with relation to the growth stage of the developing ear. Tests have shown that a dosage per ear no greater than 0.6 cubic centimeter (1/50 fluid ounce) is probably the maximum amount which may be safely used and still give good insect control. It is necessary that treatments be delayed until the completion of pollination. Ordinarily, an oil-insecticide mixture can be safely applied to ears one week after the silks first appear. By this time the silks should have begun to dry, altho no earworm damage of importance should yet be present.

Because of the normal variation in silking, even in hybrid sweet corn, at least two periods of treatment are needed to reach all ears at the proper time. A simple marking system, such as the removal of a certain leaf, is desirable to prevent treating some ears twice. It should be emphasized that the best results have been secured in the better corn plantings. Uneven stands, due to inferior soil conditions, inadequate fertilization, poor seed, or improper cultural practices, do not permit of the most effective use of the mineral oil treatment.

To insure adequate equipment for this treatment, it may be necessary to resort to homemade

devices. Commercial oil applicators designed for this purpose may be available in limited numbers, but they frequently discharge excessive amounts of oil and may be expensive and uncomfortable to operate for more than a few minutes. After the war more satisfactory commercial applicators should be available.

An ordinary plunger-type oil can, properly calibrated, may serve for small plantings. Under commercial conditions, it is generally more satisfactory to use an applicator consisting of a 1-gallon can fastened to the shoulders in knapsack fashion and connected by a length of hose to a plunger-type oil can carried in the hand. Such an applicator can often be made at home.

It is essential that the amount of oil discharged per trigger squeeze be accurately and permanently regulated. This can be done by a set-screw or some similar device. *Under no circumstances should more than 0.6 cubic centimeter (1/50 fluid ounce)* of oil be discharged at one time. Larger amounts are wasted and cause excessive tip stunting. The applicator can be calibrated with the aid of a common glass prescription bottle having graduations to indicate 1 or more fluid ounces. The oil from 50 applicator discharges should equal exactly 1 fluid ounce. At this rate 1 gallon of material should treat 6,400 ears, or more than half an average acre of sweet corn. The time required depends on the operator, altho it should be possible to treat at least 1,200 to 1,500 ears per hour.

It is suggested that at first only a few ears be treated until the operator becomes familiar with the proper technics and the results of improper dosages. Even under normal conditions a very slight amount of stunting may be noticed at the tips of some ears. This is usually not serious, especially when it is realized that the kernels of most sweet corn ears are not well filled out for a half inch or more at the tip.

Doubling Production by Bettering Soils

Condensed from Better Crops With Plant Food

C. J. Chapman

Soils Department, College of Agriculture, Madison, Wisconsin

MOST of us agree that there is still a great opportunity for increasing the productiveness of land now under cultivation. It has been said that the average Wisconsin dairy farmer is operating on about a 50 per cent efficiency basis. Total production of crops, as well as the livestock-carrying capacity and output of dairy products, could be increased a good 50 per cent—in fact it would be possible to double the gross returns on many farms if more practices of good soil, crop, and livestock management were carried out over a period of years.

If we were to take an average cross section of all the 190,000 farms in Wisconsin and compare the output of this average with production on those few farms which we consider to be models of efficiency, I think the above statements would prove to be correct. And here is the program, which, if followed out over a period of years, might make possible the doubling of the gross output and income of the average farm, and at the same time show a good profit on the practices suggested:

1. The conservation of the soil by erosion control and humus-maintenance practices.

2. The liming of every acre of acid soil on the farm, and the maintenance of adequate lime supplies by subsequent reliming every few years.

3. The return to the soil of the plant-food nutrients contained in animal manures.

4. The regular and systematic use of commercial fertilizers on all fields and crops wherever profit can be derived from its application.

5. The providing of good pasture throughout the spring, summer, and fall months. This pasture-improvement program should include the fertilization (and renovation where practical) of both permanent and rotational pasture, and the providing of emergency pasture for mid- and late-summer grazing.

6. The growing of those crops, especially alfalfa and clover, which will produce the largest

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returns in crop-feed units from our cultivated fields.

A program in which all six of the above factors are put into action and carried out over a period of years will go a long way toward accomplishing the goal of 100 per cent efficient production. But I haven't mentioned the other factor, and perhaps the most important, in this program of dairy farm efficiency, and this is my trump card:

7. Feed the good crops grown on our farms to good cows.

Good cows! And in these words I wish to convey all those principles of dairy-herd improvement and management which for a period of 50 years our colleges have so consistently preached and taught. But there is still room for improvement, even in the matter of good cows and efficient feeding practices.

The feeding of crops grown to livestock and the return of the manure produced to our soils have not maintained the productiveness of Wisconsin farm land. In fact, a careful study of the situation reveals that for years we have been "selling our farms down the river," and I am not so sure but that we have been "losing ground" faster in a livestock - dairying - farming system than is true right now in those states where most of the crops grown are sold for cash. Certainly it is true we have been burning up the humus and organic matter of our soils at a rapid rate. We have plowed and plowed to grow crop after crop of corn and grain. Our hillsides have lost both humus and the soil itself. Many of these sloping fields have been left in a naked and half-starved condition.

The statement has been made that the plant-food losses incurred in the handling of manure, produced on Wisconsin farms last year cost our farmers $100,000,000 in possible crop production. If it is true that the total value of all of the manure produced on Wisconsin farms is $100,000,000, one-third of which is lost by careless and wasteful methods of handling, and if we assume further that a dollar's worth of manure is capable of producing three dollars in crop increases, then it is true that the potential crop losses in Wisconsin last year as mentioned above did amount to a staggering total.

We are urging farmers as never before to take better care of the manure produced on their farms. Manure now has a high value. We urge our farmers to use plenty of bedding and save the liquid manure. We point out that nearly one-half of the nitrogen and from 65 to 80 per cent of the potash are contained in the urine. We further urge farmers to haul their manure every day and spread it on their fields even during the

winter months when snow covers these fields. Losses will be less where the manure is hauled and spread than where it is allowed to ferment and leach away in piles back of the barn. When fermented manure is spread in the spring or summer, we lose much of the nitrogen by evaporation in the form of ammonia.

The very fact that losses of plant food in a livestock system of farming are high and that these losses have been going on for many years is the reason why our soils are running so low on the reserves of available phosphorus and potash and why our crops are responding so generously to fertilizer treatment.

I have said that the dairy farmer may be losing fertility faster than the corn-grain farmer. I am sure this is true with respect to potash losses. In our modern grain, corn-clover system of farming most farmers leave straw and stalks on the ground where they are plowed under. A very high percentage of the potash is contained in the straw and fodder of these crops. Even where soybeans are grown in rotation with corn and grain and are combined in the field, the straw is left on the ground and thus most of the potash is returned to the soil. But in a livestock system of farming, most of the crops are fed and the potash is voided largely in the liquid manure. Furthermore, a high percentage of the potash contained in the straw and fodder used for bedding is in water-soluble form and subject to loss by leaching. On the average dairy farm, not more than 45 to 50 per cent of the potash contained in crops grown actually finds its way back to the cultivated fields in the manure. In fact, not more than 50 per cent of the nitrogen and phosphorus contained in these feeds gets back to our cultivated fields. We are short-changing our farms every year, even in a livestock system of farming.

Is it any wonder then that commercial fertilizers are being used so extensively and crops responding so tremendously to their use? We have fought a battle in Wisconsin for the past 25 years in our efforts to break down the prejudice against the use of commercial fertilizers. We have battled against the forces of indifference and that feeling of self-security which our livestock farmers have grown up with. The growing of legumes and the maintenance of a fairly good level of nitrogen on some of our farms seemed to mislead us. The lodging of grain was thought to be a sign of high fertility, but gradually it has become clear that on many of these farms where lodging was a problem there had developed an unbalanced condition

of plant-food nutrients in the soil.

Field demonstrations on our Wisconsin farms with phosphate and potash fertilizers, applied to the grain and legume seedings, have proven that yields, even on fields where lodging was a problem, could be increased. The grain may still lodge on many of these fertilized plots, although we have observed that where soil tests show a need for potash and potash was used, lodging was less severe. Catches of clover or alfalfa were usually better on those plots receiving the potash in addition to the phosphate.

I never tell a farmer that the use of potash in the fertilizer will prevent lodging, but I do make the statement that when potash is needed and used in the proper proportions, there will be less tendency to lodging. I have seen plots even where potash fertilizers were used "go down" worse than the unfertilized plots. The rankness and heaviness of growth in these cases overbalanced the advantage gained in the thicker cell walls in the plant tissues and the resulting stiffness of the straw.

However, there are thousands and thousands of acres of land in Wisconsin where lodging is not a problem. Our light-colored silt and clay loams, as well as sandy soils, are frequently so low in nitrogen that they do not produce enough straw. For our grain and legume seedings on such soils, we are finding it profitable to use fertilizers containing some nitrogen. In fact, the use of nitrogen in fertilizers for grain on the thinner, poorer soils will be more strongly advocated now that the cost of nitrogen is less and supplies are becoming more and more abundant.

Our state-wide program of soil testing has been an important factor. Records show that in the five-year period, December 1, 1938, to December 1, 1943, a total of 270,179 samples of soil were tested in our State, district, and county laboratories. The average of all the tests shows that 76 per cent of our soils are deficient in available phosphorus and 53 per cent are low in available potassium; 65 per cent of these samples are acid and the fields from which they were taken are in need of lime.

I will never argue, however, that the soil test is a 100 per cent accurate means of determining the kind of fertilizer to use. But the results of our soil tests have been very helpful in the hands of our county agents, teachers of vocational agriculture, and fertilizer salesmen, as a basis for recommending fertilizers. Certainly, recommendations made on the basis of soil tests are more accurate than simply "guesses."

The thousands of demonstra-

tions carried out all over the State have been of even greater value in "selling fertilizers" to Wisconsin farmers. Not only have these demonstrations given individual farmers a "see and believe" lesson, but these field trials carried out by county agents and teachers of vocational agriculture have likewise given "the teacher" himself first-hand information. The results of these field demonstrations have given all of us more confidence in our soil tests and recommendations based on soil tests.

Demonstrations were carried out in a program designed to call attention to the importance of using fertilizer at the time of seeding down to clover or alfalfa. The size of the average plot varied from one-half to one acre. A large number of fertilizer combination grain drills were loaned by the implement manufacturers and used by county agents in the installation of their plots. These drills were hauled by truck, trailer, or on rubber tires from farm to farm in the various counties, and frequently as many as 20 to 30 demonstrations were installed by a county agent each year. The fertilizers needed for this extensive program were supplied by the Middle West Soil Improvement Committee and the American Potash Institute.

In addition to the type of demonstration just described, we have set up a large number of so-called "whole-farm demonstrations" in co-operation with the Tennessee Valley Authority. We are now operating in 27 counties in Wisconsin under this program. In the unit-farm demonstrational work, the plan has been to set up a fertility-and crop-management program for the entire farm and carry it out over a period of five years. The phosphate is supplied by the T.V.A. (Farmer co-operators pay the freight.) However, the individual farmer co-operator is required to purchase lime and potash as needed, and he agrees further to follow out cropping practices as recommended by the supervisor of the project. Rather liberal applications of fertilizers are made at the time of seeding down to small grain and legumes. A total of nearly 500 farmers are now co-operating in these whole-farm demonstration projects in Wisconsin. In those counties where the work was first started (now in its 5th year), we have many outstanding examples of what can be accomplished through a program of fertilization and crop management. On most of the farms crop production has been greatly increased, the quality of the feed grown has been improved, and livestock-carrying capacity is now being reflected in larger herds of better fed cows.

And what do the results of all

Table 1—Average of 507 Grain Demonstrations (11 Years, Including 1943) Where a Comparison of 0-20-0 and 0-20-10 Was Made

Treatment	Average rate per acre lbs.	Average yield bu.	Increase yield bu.	Average yield straw lbs.	Increase* straw lbs.	Value of increase grain+ straw	Cost of fertilizer	Net profit per acre*
0-20-0	200	52.6	10.3	2,562	447	$6.85	$2.55	$4.30
0-20-10	200	56.7	14.4	2,727	612	9.58	3.65	5.93
Check		42.3	.....	2,115	.....	.....	.....	.....

*Oats and barley figured at average value of 60c per bushel; straw, at $3 per ton.

these fertilizer demonstrations show? It is a story in actual figures which prove without doubt that fertilizers are needed and can be used with profit on a high percentage of the farms in Wisconsin. When we average up all the data, good and bad, we find that there was a sufficient increase in the yield of grain alone to more than pay for the fertilizer in 85 per cent of all the trials. We find in comparisons made between 20 per cent superphosphate and phosphate-potash mixtures that in 55 per cent of all these trials, the P-K mixtures gave the largest profit. The average of all these grain plots, where direct comparisons were made between 0-20-0 and 0-20-10, are given in Table 1.

When the residual effect of fertilizers applied at the time of seeding was checked on hay yields the year following and the value of the increases in yield of hay was added to the value of increases in grain and straw, we find that a profit has been shown in 95 per cent of all the trials. We find further that where comparisons of superphosphate and phosphate-potash mixtures were made, the largest net profit was shown in 70 per cent of the trials where both phosphate and potash were used. Table 2 gives a complete summary showing dollar per-acre values of hay, grain, and straw plus residual carry-over benefit to the hay crop.

The results of these demonstrations carried out over a period of years give us conclusive evidence that potash is needed on quite a high percentage of the soils in Wisconsin, especially where legumes are being seeded with the grain. On the silt and clay loam soils of average fertility we are now recommending from 300 to 400 pounds of 0-20-10 or 0-14-7 per acre. On the sandier soils, where seedings of alfalfa and clover are being made, we recommend up to 400 or even 500 pounds of 0-20-20 or 0-14-14 per acre.

We did find some fields where

phosphate only was needed and occasional fields which were well supplied with all plant-food elements and where no fertilizers were needed. We urge farmers to have their soils tested, as a means of determining the fertilizer requirements of their soils.

It is my belief that the application of from 300 to 500 pounds of commercial fertilizer per acre every time we seed our fields down to clover and alfalfa will gradually build up the fertility of the farm as a whole. Large yields of grain and bigger crops of alfalfa and clover will add to the home-grown feed supply and will thus cut feed costs and increase the possible livestock-carrying capacity of the farm. We urge our farmers to take care of their stable manure and get the plant food contained in it back to their cultivated fields.

With prices for farm produce at present high levels, not only has manure a much higher value than in ordinary times, but we will find it profitable to use commercial fertilizers at heavier rates. Let's also carry out all those other practices of good soil, crop, and livestock management for greater profit now and in the years that lie ahead.

Table 2—Residual Carry-over Benefit to Hay Crop (11 Years, Including 1943) Showing Total Value of Hay, Grain, and Straw, and Profit over Cost of Fertilizer (119 Plots)

Treatment	Rate per acre lbs.	Average yield grain bu.	Value of increase grain+ straw	Average yield of hay lbs.	Increase hay lbs.	Value of increase grain, straw and hay	Cost of fertilizer	Net profit per acre
0-20-0	200	51.7	$7.27	4,477	1,048	$12.51	$2.55	$9.96*
0-20-10	200	55.3	9.68	5,078	1,649	17.93	3.65	14.28
Check		40.7	.....	3,429	.....	.....	.....	.....

*Oats and barley figured at average value of 60c per bushel; straw, at $3 per ton. Hay figured at $10 per ton.

What To Do and Not To Do About Blackhead

Condensed from Turkey World

Dr. Sivert Eriksen

BLACKHEAD in turkeys has been recognized since the early 1890's. It has been the subject of much investigation and discussion. It has likewise been the cause of many a failure in the turkey-raising venture. It is still the No. 1 potential disease on the turkey ranch.

Research work with blackhead has been carried on both in the field of cause and in the field of treatment. The causative organism is well recognized as histomonas meleagridis, as described by Tyzzer in 1920. The various cycles and ramifications of the growth of this organism, as it spreads from one turkey to another, still is not completely understood. For instance, if the pure organisms from livers of affected turkeys are fed to healthy turkeys, only a comparatively small number of these birds actually come down with blackhead. But if eggs from the cecal worms are fed to susceptible birds, a much larger number will come down with blackhead. This would indicate that histomonas meleagridis may pass through some stages of development within the cecal worm or the cecal worm egg which renders it more pathogenic to the host. There are, undoubtedly, other stages in the life cycle and development of this parasite that are not fully understood, but suffice it to say that the cecal worm eggs from the poultry yard are the most active and the most dangerous sources of blackhead infection.

From a practical standpoint, therefore, we may very well think of blackhead control in terms of cecal worm control.

The first principle of blackhead control is to start out with absolutely clean yards, clean pens, clean houses and a healthy brood of poults. In most cases that is not so difficult, because the poult that comes from the egg is free from blackhead.

Second, the cleaning and disinfection of the house is possible, even though it is difficult. It means a thorough, complete scrubbing with hot soap and lye water that gets into every crack and crevice, and then while it is still wet, a good going over with a reliable disinfectant. That

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means, feeders, waterers, roosts, and everything with which the birds are to come in contact.

Third, sanitary yards are more difficult. It is true you can move the house onto ground not previously occupied by chicks or turkeys, and you can keep adult chickens and turkeys off that ground during the year the poults are ranging there, but you cannot keep out sparrows, blackbirds, pigeons, and other birds, or even rodents, that may carry droppings or other material laden with cecal worm eggs, and that can easily be the source of a new blackhead infection in a flock that has been kept immaculately clean. It is the spread of infection from outside and usually unknown sources that makes blackhead still a problem, even though we do know a great deal about raising turkeys under sanitary conditions.

That very fact necessitates continuous vigilance and the lookout for the first sign of blackhead. Every turkey that dies should be opened and examined. That is the only way a person can keep in touch with what is going on in the poultry yard. Do not take anything for granted. Every dead bird must be opened and examined as carefully as possible. As long as no signs of blackhead appear in birds that have died, good and well; but the very first one that passes out with a typical picture of blackhead which is cheesy cores, firmly fastened to portions of the ceca, either one or both, a great deal of foul-smelling, pasty or semi-liquid material, and gaseous distention of the ceca, any one or all of which may occur at the same time, then it's time for action. This, plus the typical nodules of the liver are further indications that the disease is present. These nodules may vary from pin-point size growths to those of larger size. There may be only a few in the liver, or the liver may be almost filled with them. These small growths within the liver are the early stages of blackhead. If the bird does not die in this stage, then these growths enlarge, and there will be a stage of degeneration in the center of the nodule. If the bird lives on for a little while longer, there will be a sunken, dark pit in the middle of this necrotic area and around that will be a reddish, and finally a grayish zone. This is the contact point between the nodule of blackhead and the normal liver tissue. The further the case has advanced, the more the necrotic area will show up.

The lesions of blackhead in the liver are not always the same, but they show progression from the fork-like tissue growth to the necrotic, yellowish, depressed areas throughout the liver. The amount of liver involvement varies greatly also from a few

spots scattered here and there to a general liver tissue destruction. The same nodules never are found on the spleen, or other organs, as they are in tuberculosis or in tumors. That's the best method of differentiation. If you find nodules in other organs similar to those found in the liver, then you can be quite sure that it is not blackhead. Naturally, if the lesions do not show blackhead, there is no particular need of being concerned or starting a blackhead treatment. But the very first one that shows these lesions indicates definitely that the blackhead danger is present and may become serious if not taken in hand at once.

1. Give the flock a worm removing treatment, one designed particularly for removing the cecal worms. Products containing nicotine, carried over a period of time, are reasonably effective. Products containing phenothiazine also are effective. One must keep in mind that phenothiazine is no magic word, and the medicine must be used properly before one can expect to get results. One must be on the alert for products containing only minute quantities of phenothiazine — those which do not have enough to actually remove the worms. Phenothiazine is quite specific for cecal worms only, but too much must not be expected of it. Its principal value is to prevent cecal worms, thereby destroying one of the principal sources of infection. One must give the proper size dose, and one must continue it for a long enough period of time to get results.

2. Give a general laxative to remove as much of the material that has accumulated in the intestinal tract as possible. Epsom salt is usually sufficient.

3. Follow with some intestinal medication which has, in your past experience, proved successful. There is much controversy about the use of acids and various other medicines in the treatment for blackhead. Scientifically, it never has been shown that they were of value, but many flockowners feel that they have gotten good results in infected cases by using proper medication of that type. After all, one *must* be governed largely by one's experience in the past.

4. Move to clean grounds. The reason we suggest the use of phenothiazine, tobacco dust and other medication first is to get rid of the parasites and leave them on the old ground, not move them first and then medicate to expel the worms that still may be present and leave new seed on the clean ground. At the time of moving, clean and disinfect all equipment that is moved, the same as is recommended for the first brooding house sanitation program.

5. Watch the birds carefully every day. If necessary to repeat the treatment within a week or two, do not hesitate to do that. Sometimes, a second treatment is necessary to keep the infection under control.

There Is No Specific Medication

As yet, there is no specific medication available for the treatment of blackhead. Many medicines have been tried, some have proved specific in the experimental stages, but these are either too expensive or too toxic so that they are not yet available to the public. Many other treatments, such as turpentine, and other home remedies cannot be proved of scientific value. Do not depend upon these remedies, but follow the program outlined under "What To Do."

Flocks that recover, and birds that have had light attacks of blackhead apparently do recover occasionally, seem to be immune to further infection.

What Not to Do for Blackhead

1. Don't worry about blackhead. Follow the established practices for prevention, and there will be no need to worry.

2. Don't raise chickens and turkeys together on the same premises. Arrange the farm so the turkeys are on one end of the farm and chickens on the other. Birds will get over the fences, if fenced close together.

3. Don't let flying birds, rodents, dogs, cats, etc., enter your turkey yard, if you can possibly prevent it.

4. Don't expect vaccination to control blackhead. While vaccination with cholera and typhoid bacterin often is used in flocks, and many people think they do a good job, the only possible good they could do would be to prevent cholera and typhoid for which they are prepared. There is no bacterin or any other medicine injected with a syringe that is of value against blackhead itself.

5. Don't misdiagnose blackhead. Check each time so you will know for what you are treating. Typhoids, para typhoids, and cholera easily can be mistaken, unless you post the bird and look for lesions.

6. Don't depend upon sanitation alone, because blackhead infection comes in from other sources.

7. Don't depend upon medication alone, but combine medication when necessary with sanitation, and then you have a real effective means of attack.

8. Don't believe that blackhead is transmitted from the parent stock through the egg. It is not. It may, however, come with droppings on dirty eggs. Eggs that go in the incubators should be fumigated after cleaning.

9. Don't believe that blackhead is the only disease that kills turkeys. Remember, that paratyphoid, typhoids, and cholera, leucocytozoon, trichomonas, and a number of other parasites take a very deadly toll, some in one community, some in another, some at one age worse than other ages.

10. Don't forget that blackhead may affect birds raised inside, as well as in outside pens.

11. Don't take anything for granted.

BOOKS OF CURRENT INTEREST

THE AMERICAN LAND—Its History and Its Uses, by William R. VanDersal, biologist in the United States Department of Agriculture.

What America was in the beginning, what American land is now, and an inkling of what it may be in the future form the subject of this interesting new book. It comes as a timely contribution in an era when Americans are rediscovering the American soil, which war with its attendant problems and emotions has brought sharply into focus.

Publishers: Oxford University Press 215 pages $3.75

NATURAL PRINCIPLES OF LAND USE by Edward H. Graham, Chief of the Biology Division of the Soil Conservation Service.

This book deals with ways in which a knowledge of biological principles can be profitably applied to the management of farm land, forests, range and wildlife. **Natural Principles of Land Use** is of particular significance at this time when farmers are concerned with putting their land to its fullest production and its most scientific use. Startling photographs are used to illustrate the absorbing material of this book.

Publishers: Oxford University Press 275 pages $3.50

FOR THE FARMER'S LIBRARY

These books are recommended as outstanding in their field:

A Living from Bees—By Frank C. Pellett, Field Editor of American Bee Journal. Orange Judd Publishing Co., Inc. (1943). $2.00.

America's Garden Book — By Louise Bush-Brown and James Bush-Brown. Charles Scribner's Sons (1939). $3.50.

Animal Sanitation and Disease Control—By Dr. R. R. Dykstra, Dean of the School of Veterinary Medicine, Kansas State College. The Interstate Printers and Publishers. $2.85.

Beekeeping — By Everett Franklin Phillips, Professor of Apiculture, Cornell University. The Macmillan Co. $4.00.

Beef Cattle — By Roscoe R. Snapp, Asso. Prof. Animal Husbandry, Univ. of Illinois. John Wiley & Sons, Inc. $4.00.

Beef Cattle Production in the South—By D. W. Williams, Head, Department of Animal Husbandry, A. & M. College of Texas, College Station, Texas. The Interstate Printers & Publishers (1941). $2.00.

Dairy Cattle and Milk Production — By Clarence H. Eckles, B.S.A., D.Sc., late Chief, Div. of Dairy Husbandry, Univ. of Minnesota. The Macmillan Co. $3.90.

Dairy Science — By W. E. Petersen, Ph.D., Assoc. Prof. and Assoc. Dairy Husbandryman, Univ. of Minn. Edited by R. W. Gregory. J. B. Lippincott Company (1939). $4.00.

Farm Shop Practice—By Mack M. Jones, M.S., Agri. Engineering, Univ. of Mo. McGraw-Hill Book Co., Inc. $2.75.

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, Cornell Univ. Morrison Press. $5.00.

Farm Meats—By M. D. Helser, B.S.A., M.S., Prof. Animal Husbandry, Iowa State College. The Macmillan Co. $3.25.

Farm Management—By Robert R. Hudelson. The Macmillan Co. $2.00.

Farm Management and Marketing—By V. B. Hart, Ext. Professor of Farm Management; M. C. Bond, Ext. Professor of Marketing; L. C. Cunningham, Ext. Asso. Professor of Farm Management; all of N. Y. State College of Agriculture, Cornell University. Publishers: John Wiley & Sons, Inc. (1942). $2.75.

Farm Accounting—By Donald R. Mitchell, Asst. Prof. Agri. Economics, Univ. of Wisc. McGraw-Hill Book Co., Inc. (1941). $2.50.

Forestry in Farm Management—By R. H. Westveld and Ralph H. Peck. John Wiley & Sons, Inc. (1941). $3.00.

Farm Records—By John A. Hopkins, Ph.D., Asso. Prof. of Economics, Iowa State College. Iowa State College Press. $2.50.

Gardening for Good Eating—By Helen Morganthau Fox, Gardener and Author. The Macmillan Co. $2.50.

Grow Your Own Fruit—By M. G. Kains, formerly with U. S. Dept. of Agriculture; Professor of Horticulture, Pennsylvania State College. Charles Scribner's Sons. $3.50.

Home Vegetable Gardening—By Charles S. Nissley, Extension Horticulturist in Vegetable Growing. Rutgers Univ. Press (1942). $1.50.

How to Raise Rabbits for Food and War—By Frank G. Ashbrook, Fish and Wildlife Service, U. S. Dept. of the Interior. Orange Judd Publishing Co., Inc. (1943). $2.00.

Judging Dairy Cattle—By Edwin S. Harrison, Professor of Animal Husbandry, Cornell University. John Wiley and Sons, Inc. $2.75.

Livestock Production—By Walter H. Peters, Chief of the Division of Animal and Poultry Husbandry, Univ. of Minn. McGraw-Hill Book Co., Inc. $3.50.

Livestock Judging Handbook—By Julius E. Nordby, Asst. Prof. Animal Husb., Univ. Idaho, and W. Malcolm Beeson, Ph.D., Asst. Prof. Animal Husb., Univ. Idaho. The Interstate Printers. $2.60.

Plowman's Folly—By Edward H. Faulkner. (1943) Grosset and Dunlap. $1.00.

Plowman's Folly — By Edward H. Faulkner. University of Oklahoma Press (1943). $2.00.

Poultry—By A. R. Winter, Asst. Prof. Poultry Husbandry, Ohio State Univ., and E. M. Funk, Asst. Prof. Poultry Husbandry, Mo. State Univ. J. B. Lippincott Co. $5.00.

Poultry Husbandry—By Morley A. Jull, Prof. of Poultry Husbandry, Univ. of Maryland. McGraw-Hill Book Co., Inc. $4.00.

Pork Production—By William W. Smith, Prof. of Animal Husbandry, Purdue Univ. The Macmillan Co. $3.75.

Practical Poultry Management—By James E. Rice, Emeritus Professor of Poultry Husbandry, and Harold E. Botsford, Extension Professor of Poultry Husbandry, both at New York State College of Agriculture. Fourth Edition (1940), John Wiley & Sons, Inc. $2.75.

Practical Horse Breeding and Training — By Jack Widmer. Charles Scribner's Sons (1942). $3.00.

Repairing Farm Machinery—By Ivan G. Morrison, Asst. Professor Agri. Education, Purdue University. The Interstate Printers & Publishers. $1.80.

Profitable Poultry Keeping — By H. Clyde Knandel, Prof. and Head, Dept. of Poultry Husb., Penn State College. Orange Judd Publishing Co., Inc. $3.00.

Sheep Production—By Levi Jackson Horlacher, B.S.A., M.A., Asst. to Dean, Col. Ag. Univ. Ky. McGraw-Hill Book Co., Inc. $4.00.

Sheep—By Levi Jackson Horlacher, Prof. of Animal Husbandry, Univ. of Kentucky. The Interstate Printers and Publishers. $2.00.

Soil Conservation — By Hugh Hammond Bennett, Chief, Soil Conservation Service, U. S. Department of Agriculture. McGraw-Hill Book Company, Inc. $6.00.

Some Common Diseases of the Horse—By George R. Conn, B.S.A.H., D.V.M., Orange Judd Publishing Co., Inc. (1942). $1.50.

Some Common Diseases of Cattle—By George R. Conn, B.S.A.H., D.V.M. Orange Judd Publishing Co., Inc. (1942). $1.50.

Soybeans—Gold from the Soil — By Edward Jerome Dies. The Macmillan Co. $1.75.

The Home Veterinarian's Handbook—By E. T. Baker, Veterinarian, Moscow, Idaho. The Macmillan Company (1943). $2.50.

The Farm Primer—By Walter Magnes Teller, formerly with the Farm Security Administration, U. S. D. A. David McKay Co. $2.50.

The Western Horse—Its Training, Type and Marketing. By John A. Gorman, Asso. Prof. Animal Production, Univ. of Wyoming. The Interstate Printers and Publishers. $1.65.

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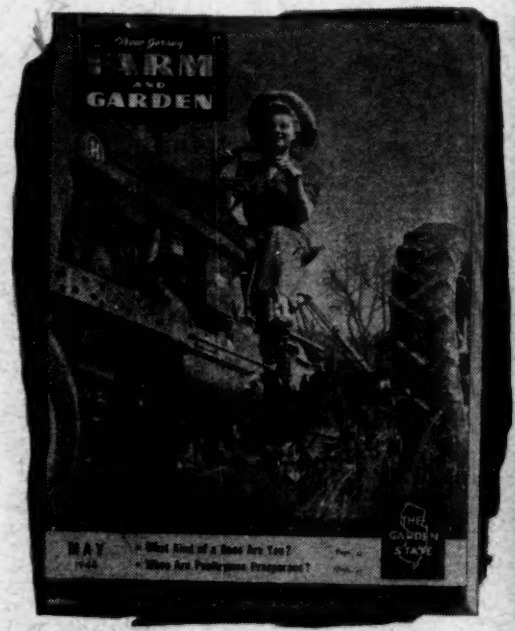

Heading the editorial board is Willard H. Allen, New Jersey Secretary of Agriculture; Dr. William H. Martin, dean of New Jersey's Agricultural College; J. C. Taylor, extension poultryman; Prof. Enos J. Perry, dairy specialist (the man, by the way, who brought cooperative artificial insemination to this country); and Dr. C. A. Nissley, vegetable specialist.

An outgrowth of the Garden State Farmer, **New Jersey Farm and Garden** has been under its present ownership and management for fourteen years. Editor and publisher is William A. Haffert, a man of wide agricultural and journalistic experience; associate editors are Paul C. Rice, W. Frank Knowles, and Wallace S. Moreland, the latter author of the currently best-seller farm book, "A Practical Guide to Successful Farming."

Believing we learn best by experience, stories of practical, successful farmers in New Jersey are featured in each issue. These are all liberally illustrated. There are regular departments for the dairyman, vegetable grower and fruitmen. The poultry section is especially strong, as many as 24 pages being devoted to this subject in a single issue.

Published monthly, **New Jersey Farm and Garden** runs from 48 to 68 pages. Subscription price is $1 for two years. Publication address is Garden State Building, Sea Isle City, N. J.

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